Science and God in the Election

THIS IS THE FIRST ISSUE OF THE NEW YEAR, AND GUESS WHAT? IT’S AN ELECTION YEAR IN THE United States, and other nations are watching the developments with interest. So Science’s News Focus section, beginning on p. 22, presents some of the major presidential candidates’ views about science and science policy. We hope that these will give citizens of all countries a sense of how these aspirants would meet the essentially global challenges that rest on science and technology, including climate change, health policy, resource management, and energy conservation.

This election will be carried out amid new forces that have put the religious commitments of the candidates at the political center stage, a phenomenon now endemic to the United States but to few other non-Muslim nations. This contemporary dimension of presidential politics was brought into focus for me when a questioner in one of the “debates” brandished a copy of the Bible and asked the Republican candidates: “How you answer this question will tell us everything we need to know about you. Do you believe every word of this book?” It brought forth affirmative responses, with occasional limiting reservations about “metaphor” or “allegory,” putting God right in the voting booth.

With respect to faith disclosures in politics, this is something new. This year, candidate Romney gave a speech to explain his Mormon faith, perhaps reassuring the evangelical Republican base by identifying Jesus Christ as “the son of God and the savior of mankind.” Nearly 50 years ago, John Kennedy gave a speech in which he reassured the 1960 electorate about his Catholicism. He simply said that his religion would not affect his position as the U.S. president. Unlike Romney, he didn’t give the voters an exegesis of his own faith; he clearly indicated that his private religious commitments would stay outside the Oval Office and were therefore not their business.

But these days, presidential candidates—even some Democrats—find it necessary to use religion to qualify their electability. The First Amendment of the U.S. Constitution is clear on prohibiting the establishment of a national religion. Yet in the election, we have been told repeatedly that the United States is a “Christian nation.” This assertion might pass as the “free exercise” of religious preference as a fundamental right, a clause that has repeatedly clashed with the establishment clause. But when a candidate tries to persuade voters that his faith constitutes a claim on their vote, it surely touches on the establishment clause.

Given this new focus on religious disclosure, what does this U.S. election have to do with science? Everything. The candidates should be asked hard questions about science policy, including questions about how those positions reflect belief. What is your view about stem cell research, and does it relate to a view of the time at which human life begins? Have you examined the scientific evidence regarding the age of Earth? Can the process of organic evolution lead to the production of new species, and how? Are you able to look at data on past climates in search of inferences about the future of climate change?

Especially because we are in a new era of faith advertisement, we should demand that candidates provide thoughtful answers to such scientific questions. That religion has entered the political space should not produce a conflict between science and religion. Some of my scientist friends are religiously committed, others are actively disengaged, and both kinds are principled. Most of them are disinclined to join the religion versus science debate, which has become uncomfortably combustible.

But we share a right to press candidates about their views on the boundary. After all, determined efforts have been made to introduce scriptural versions of the age of Earth or of “intelligent design” in science classrooms. We need to know the candidates’ qualifications for understanding and judging science, and for speaking intelligently about science and technology to the leaders of other nations in planning our collective global future. I don’t need them to describe their faith; that’s their business and not mine. But I do care about their scientific knowledge and how it will inform their leadership.

– Donald Kennedy

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2008 U.S. BUDGET

Promising Year Ends Badly After Fiscal Showdown Squeezes Science

The U.S. science community’s reaction to the 2008 federal budget adopted last month has been uniformly bleak. “A step backwards, … a missed opportunity, … a keen disappointment” declared press releases from advocates, including AAAS (which publishes Science), about a belated, $555 billion spending package (HR 2764) that was cobbled together and approved in a 4-day rush before the holidays. Those sad words are a reaction to the last-minute rollback of substantial planned increases for science that occurred after the Democratic-controlled Congress lost a showdown with the Republican White House.

The year began on a high note in February when President George W. Bush submitted his second straight request for large increases in the physical sciences at the National Science Foundation (NSF), the Department of Energy (DOE), and the National Institute of Standards and Technology (NIST), three agencies that constitute his American Competitiveness Initiative (ACI) (Science, 9 February 2007, p. 750). The good vibes continued with passage last summer of the America COMPETES Act, which contained even higher authorized spending levels for research, education and training, and innovation (Science, 10 August 2007, p. 736). Separate House and Senate spending panels working on the 2008 budget also matched or exceeded the president’s request for several science agencies. But the legislation either languished in Congress or, in the case of a bill involving the National Institutes of Health (NIH), was vetoed by the president.

In the end, the numbers in the so-called omnibus spending bill (HR 2764) that was signed by President Bush the day after Christmas are much smaller than science boosters had thought likely for the 2008 fiscal year that began on 1 October. Research spending at NSF, for instance, will rise by only $56 million, to $4.8 billion, rather than by the $365 million requested back in February or by the even higher amounts the House and Senate had approved separately last fall. DOE’s Office of Science saw a requested 15% increase in its $3.8 billion budget, which legislators had embraced, shrink by two-thirds. Programs in high-energy physics and fusion sciences were hit especially hard (for details, see ScienceNOW, www.sciencenow.org, for 18, 19, and 21 December 2007), and more than half of the growth is devoted to special projects earmarked by legislators. NIST winds up with a scant $6 million more for its core $434 million research programs instead of the $65 million boost that the president requested and legislators had approved earlier.

The pictures at other agencies not under the ACI umbrella are no brighter. NIH’s $29.1 billion budget remains essentially flat once a $300 million transfer is subtracted; that’s better than the 1% cut the president had sought but much less than a 3.7% rise Congress approved in the bill he vetoed this fall. NASA managed to hold onto the president’s requested increase, a 3.1% jump to $17.3 billion. But it lost a $1 billion bump that legislators had previously adopted. Within that total, its $5.57 billion science budget, up $111 million, is eroded by millions of dollars in earmarks and directed spending for specific missions the agency hadn’t requested.

Why did science fall short? Despite bipartisan support for boosting research budgets, larger forces prevailed. By threatening to veto any bills that exceeded his bottom line of $932 billion for domestic programs—which includes all research spending outside the Department of Defense—President Bush succeeded in...
forcing Democratic leaders to abandon $22 billion in additional proposed spending. The retreat affected almost every agency.

The legislators most intimately involved in the process—the chairs of the spending panels that assembled the individual pieces of the 1400-page bill—are no happier than their constituents. “The Commerce, Justice, Science Sub-committee agrees that the bill represents inadequate funding across the departments and agencies under our jurisdiction,” says Representative Alan Mollohan (D–WV), chair of the panel that oversees NSF, NASA, the National Oceanic and Atmospheric Administration, and NIST. “The House-passed bill,” Mollohan laments, “is far more representative of the committee’s priorities than is the omnibus.”

Presidential science adviser John Marburger says he’s also disappointed by the terms of the omnibus bill, although he says the president was pleased with its bottom line. “The most surprising aspect to me is the absence of any visible priority for basic research in the physical sciences … after the president asked for the money,” Marburger told Science. Mollohan’s comments are equally partisan. “Between the holes in President Bush’s budget request and his veto threats,” he says, the committee had little choice but to make “several rounds of unpleasant cuts.”

NSF’s budget reflects those last-minute changes. Only a few days before the final deal was announced on 15 December, NSF’s budget was still at the president’s request of $6.43 billion. It had survived a previous round of cuts imposed after Democratic leaders shaved $11 billion off their earlier total. But then the leadership ordered another $11 billion to be pared to satisfy the president’s demands. That’s when a $514 million overall increase for NSF, to $6.43 billion, shrunk to $150 million.

Traces of the promised largess can still be found in the report accompanying the massive bill, in language a staffer admits “was written before the cuts were taken.” The legislators urge NSF to give the biological sciences and the social, behavioral, and economic sciences “comparable growth” to what the math and physical sciences, computer sciences, and engineering directorates are receiving—although the budgets of all six research directorates are essentially flat. And two programs within those directorates receive special treatment. NSF was ordered “to provide the budget request” for operating all its ground-based telescopes, part of a strong lobbying campaign by supporters of the Arecibo radio telescope in Puerto Rico after NSF decided to reduce funding for the observatory (Science, 10 November 2006, p. 904). And legislators actually added $8 million to the $107 million requested for the Experimental Program to Stimulate Competitive Research, a long-running program to help 27 have-not states and territories.

NSF Director Arden Bement says those two directives “will pinch” other programs. As one NSF staffer notes, “those are all things that you can do with a $500 million increase. But we’re only getting $56 million [more for research].”

Despite the lower ceiling, Mollohan still made an effort to accommodate agencies’ wishes. NSF, for example, received all but $4 million of a $40 million requested increase in its $246 million account for salaries and operations. “I consider that to be a victory” for an overburdened merit-review system, says Bement, “and a sign that Congress realizes its importance.” Congressional aides say that Bement made clear it was a top priority.

Along with their scalpel, legislators also used an administrative fiat to meet the lowered spending ceiling. NSF must return $33 million, and NASA $192 million, from funds not spent during the 2007 fiscal year. DOE’s Office of Science was ordered to trim 0.9%, or a total of $33 million, from what it has received in fiscal year 2008 for current activities.

Some other legislative priorities scattered throughout the omnibus bill include:

• The National Children’s Study to track the health of 100,000 infants from birth to age 21 will get an increase of $42 million, to $111 million. NIH officials had said the $3 billion study is too expensive to continue (Science, 9 February 2007, p. 751). Congress also required “all investigators funded by the NIH” to submit final peer-reviewed manuscripts of papers accepted for publication to NIH’s PubMed Central for release on the Internet “no later than 12 months after the official date of publication.”
• NASA was given $40 million for future earth science missions, $60 million for the Space Interferometry Mission—$38.4 million more than it had requested—and $5 million to determine the next outer-planet destination. It will have $42 million to develop a robotic lunar lander, a mission that NASA had dropped to accommodate construction of its new rocket. Legislators also allocated $13.5 million more for microgravity life and physical sciences.
• Applied energy research at DOE may be the biggest winner. The department’s Energy Efficiency and Renewable Energy budget will rise by $282 million in 2008, to $1.7 billion, although $180 million of the increase will go to research and demonstration projects earmarked by legislators. The added program money will launch a $55 million project at the National Renewable Energy Laboratory in Golden, Colorado, to connect renewable energy systems such as intermittent wind power or plug-in hybrid cars to the U.S. electrical grid system. Legislators also added $40 million to the president’s $79 million request for research on carbon sequestration.

[U.S. Research Takes a Dip]

Going downhill. Research spending has failed to match inflation despite small increases this year for NSF, DOE, and NASA.

Many factors can make or break a U.S. presidential candidate in the 2008 race for his or her party’s nomination. The ability to raise millions of dollars is key, as are positions on megaissues such as the Iraq war, immigration, and taxes. Voters also want to know if a candidate can be trusted to do the right thing in a crunch. Science and scientific issues? So far, with the exception of global warming, they are not getting much play.

“It’s pretty hard to find a candidate from either party who is gung ho for science,” laments Representative Vernon Ehlers (R–MI), one of two Ph.D. physicists in Congress and an indefatigable promoter of science and technology. (As a supporter of Mitt Romney, whose father was governor of Ehlers’s home state of Michigan back in the 1960s, Ehlers will be trying to pump science and technology into his campaign.)

But just because science isn’t on the front burner in this year’s seemingly interminable election campaign, that doesn’t mean the community should tune out. The candidates are addressing issues, from climate change to how the next Administration should manage science, that will affect researchers next year—and for decades to come. Differences have emerged on embryonic stem cell research, on the urgency of combating climate change, and even on the teaching of evolution.

What are they saying on the stump, and how would they govern? This special report tries to answer those questions by examining the leading contenders among the Democrats and the Republicans, in alphabetical order, based on recent polls identifying those with a plausible shot at their respective nominations. (We’ve also provided basic information on the rest of the field.)

Although none of the campaigns afforded us direct access to the candidates themselves—a telling indicator of the importance of science in the campaign, perhaps—we’ve talked to some of their advisers, as well as to colleagues, friends and foes alike, who are familiar with their careers.

By the time you read this, some of the candidates may have surged, and others may have slumped. However, the issues seem likely to remain relevant no matter who becomes the 44th president of the United States.

—JEFFREY MERVIS
HILLARY CLINTON’S SPEECH AT THE CARNEGIE INSTITUTION of Washington on 4 October, the 50th anniversary of the launch of Sputnik, was the most detailed examination of science policy that any presidential candidate has offered to date. That’s not surprising, however, given the extensive network of former advisers to her husband that the Democratic front-runner has tapped.

Their voices could be heard in Clinton’s emphasis on innovation to drive economic growth, a bottom line that is as much a creature of the 1990s as grunge music. And the senator from New York linked her call for Americans to better “compete and innovate” to a post-Sputnik plea by President Dwight Eisenhower for “heroism, sacrifice, and accomplishment when the chips are down.”

But campaign adviser Thomas Kalil, formerly a technology official in the Clinton Administration and now an administrator at the University of California, Berkeley, insists that the candidate’s science platform is not stuck in the past. “2008 is not 1992,” he says. “There are a new set of challenges.”

Those new challenges include reducing the country’s dependence on foreign oil, responding to climate change, and reversing what Clinton calls the Bush Administration’s “assault on science.” To address the first two, Clinton has proposed a $50 billion research and deployment fund for green energy that she’d pay for by increasing federal taxes and royalties on oil companies. She would also establish a national energy council to oversee federal climate and greentech research and deployment programs. Both steps, she says, would help achieve the goal of an 80% reduction in carbon emissions from 1990 levels by 2050 and use tax credits, regulations, and carbon caps to create “5 million new jobs in clean energy over the next decade.”

Last month, as a member of the Senate Environment and Public Works Committee, she voted for a bill almost as aggressive that passed along party lines, although the panel failed to adopt several amendments she offered (Science, 14 December, p. 1708).

To end what she calls President George W. Bush’s “open season on open inquiry,” the 60-year-old lawyer and former first lady says that her science adviser would report directly to her rather than be “filtered through political advisers.” Government advisory committees must not be hamstrung by political considerations, she adds, which she insists has happened repeatedly since Bush took office. In her Carnegie speech, she also promised an executive order that would “ban political appointees from altering or removing scientific conclusions in government publications without any legitimate basis … and prohibit unwarranted suppression of public statements by government scientists.”

But science policy expert Roger Pielke Jr. of the University of Colorado, Boulder, says her efforts to stop political meddling are poorly defined and won’t work. “What is ‘legitimate’ and ‘unwarranted?’” he asks. “As written, [the proposal] is a political Rorschach test.”

Clinton Administration–era official Ellis Mottur helped the campaign prepare her package of proposals, and Kalil and former White House science officials Neal Lane and Henry Kelly, who is now head of the Federation of American Scientists, were among a crew of unpaid advisers who offered input. Mottur says that he expects “the science-technology issues will come more to the fore in the general election.”

In the meantime, Clinton has called for another doubling of the $30-billion-a-year National Institutes of Health budget during the next decade, the preservation of the NASA team involved in the shuttle program even as the agency shifts to new exploration missions, and the augmentation of NASA’s earth science and aeronautics programs. But finding the money won’t be any easier than mustering the political will to tax energy companies, Pielke predicts. “Good luck finding room in the R&D budget for all of that,” he says.

However, supporting good research isn’t just about money, says physicist David Moncton, director of the Nuclear Reactor Laboratory at the Massachusetts Institute of Technology and a former administrator at two national laboratories. Just as important as any budget, says Moncton, who is not advising the campaign, are “competent individuals managing [science policy].” And Moncton thinks “that might be more likely to happen with a Hillary Clinton [presidency].”

—ELI KINTISCH

Information on Other Candidates in the Race:

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JOHN EDWARDS MADE A FORTUNE AS A PERSONAL-INJURY lawyer in the 1980s and was John Kerry’s vice president on the unsuccessful Democratic presidential ticket in 2004. But this year, he is campaigning as a populist and a Washington outsider.

The son of mill workers, Edwards pounds away at the “big, powerful interests,” the “corrupt,” and the “very greedy” in his standard stump speech. The 54-year-old former North Carolina senator (1998–2004) wants to make sweeping changes, some of which would affect research. He would end what he calls the “antisience” practices of George W. Bush’s Administration—such as “censoring research and slanting policy on climate change, on air pollution, on stem cell research.” And he would increase science funding. Despite such promises, however, biomedical researchers who remember the malpractice lawsuits that Edwards championed 2 decades ago—some of which were based on questionable science—are wary.

If Edwards actually does move into the White House, he says his own presidential science adviser would have more clout than the current one and would play “a central role as an assistant to the president.” To protect scientific integrity, Edwards would “eliminate political litmus tests for government scientists” and forbid political appointees “from overriding agencies’ scientific findings unless the chief White House science adviser concludes they are erroneous.”

Edwards’s agenda for improving the U.S. economy includes a mixture of very specific projects and broad promises. For example, he advocates a low-cost “universal Internet” for rural communities and more research on autism and fragile X syndrome, a genetic cause of mental impairment. He favors federal funding of human embryonic stem cell research, including nuclear DNA transfer. He wants to create a universal, federally backed health system. And his spokesperson, Audrey Waters, says he supports budget increases “substantially better than the pace of inflation” for the

REPUBLICAN
RUDOLPH GIULIANI
Most Recent Job: Founder and Executive, Giuliani Partners  Age: 63

SPEAKING “IN THE MOST HUMBLE WAY POSSIBLE,” RUDY Giuliani disclosed on the campaign stump in Iowa last summer that “I’m very good at doing the impossible. I am.” Indeed, he’s made a career of slaying dragons, including winning the convictions of prominent Wall Street and organized crime figures as a federal prosecutor in the 1980s and overseeing a huge drop in New York City’s crime rate as its mayor from 1993 to 2001.

So what does this 63-year-old dragon slayer make of science? That’s hard to determine because his campaign successfully discouraged key advisers from speaking to Science about specific issues. But his public career suggests that Giuliani is a pragmatist with a quick grasp of issues, a lover of statistics, and a firm believer that most tasks can be done better by private institutions than by government.

On social issues, Giuliani stands out among the Republicans for what he has said about abortion: With reservations, he would let the woman decide what to do. On a linked topic, research on human embryonic stem cells, he said in May that “as long as we’re not creating life in order to destroy it—as long as we’re not having human cloning … I would support [federal funding].” David Carmel, a biotech executive and member of the board of the New York Stem Cell Foundation, made the case for embryonic stem cell research in a private debate last fall that the candidate staged to explore both sides of the issue. Based on Giuliani’s questions, Carmel says he believes Giuliani, if elected, would reduce federal restrictions.
National Institutes of Health (NIH) and the National Science Foundation.

On environmental policy, Edwards has won the "enthusiastic endorse-
ment" of Friends of the Earth Action, the nonprofit group’s
political arm. That support is based in part on his proposal to
cut greenhouse gas emissions by 80% by 2050, using a cap-and-
trade system to auction off permits as a regulatory incentive. 
Edwards says he would take at least $10 billion a year from that auction and another $3 billion from other sources to invest in a trust fund for new technologies. It would develop solar, wind, and "cellulose-based biofuel" projects. 

The environmentalists are also pleased with what Edwards would not do. He opposes any expansion of nuclear power, the candidate explained in a recent debate, because it is "extremely costly ... and we don’t have a safe way to dispose of the nuclear waste." Liquefied coal is out, too, he says, because "the last thing we need is another carbon-based fuel;"

Yet among scientists, Edwards "carries some baggage," says Peter Agre, a Nobel Prize–winning biochemist now at Johns Hopkins University in Baltimore, Maryland. Although Edwards is a "good man," says Agre, "I know people who would never vote for him" because of the way he and other lawyers pursued and won multi-
million-dollar medical malpractice awards repre-
senting children born with cerebral palsy.

In a 1985 case, for example, Edwards

Giuliani’s record as mayor and author add few clues about his outlook on science. Rodney Nichols, former president of the New York Academy of Sciences (NYAS), gives him high marks for his interest in two city-backed projects involving science and somewhat lower marks for follow-
through. Nichols recalls how the mayor agreed to host an NYAS award to honor scientific excel-
ence, even though it “would not win [him] votes.” At the same time, Nichols says that “not much came” of a panel on how to bring biotech
companies into the city, as the mayor lost interest once local medical institutions began to jockey for concessions.

In his 2002 book Leadership, Giuliani wrote, “I loved learning biology” as a premedical student at Manhattan College. But in the end, he says that he chose law school and politics because “I liked ideas better than science.” New York City invested heavily in crime statistics—a system called CompStat—to help command a burgeoning police force. The model has been copied in many cities, and Giuliani has proposed clones for other tasks, which he calls JobStat, SchoolStat, EnergyStat, and HealthStat.

The technical issue that proved most controversial for Giuliani this fall, in fact, involved his use of health data. An ad in New Hampshire claimed that people diagnosed with prostate cancer (as he was in 2000) in the United Kingdom are more likely to die of their disease because of its sys-
tem of “socialized medicine” than their U.S. counterparts. The ad cited survival rates of 82% for the United States and 44% for Britain. This pro-
voked a flurry of criticism. A spokesperson for Giuliani revealed that the candidate found the data in the journal of the Manhattan Institute for Pol-
cy Research, a conservative think tank to which he has close ties.

Experts say it’s easy to misread the numbers. Recent data from the U.S. National Cancer Institute and an international survey called Eurocare indicate that the 5-year survival rates are about 77% for Britain and 98% for the United States. What this shows, according to biostatistician Donald Berry of the M. D. Anderson Cancer Center in Houston, Texas, is that U.S. doctors screen and diagnose more patients, finding prostate can-
cer in people not at risk of dying from it, and that “there is no credible evi-
dence that screening decreases prostate cancer mortality.” The Giuliani campaign has said it won’t stop using the original ad data.

Giuliani’s campaign has skated lightly over most issues with scientific
and technological components. On energy, for example, he would boost all
domestic energy sources, emphasizing coal, nuclear power, ethanol (with
a goal of 20% more output), and renewable sources such as windmills, but
he has not spelled out how this would work. Likewise, his pledges to “pro-
mote science and mathematics through technical certification or an associ-
ate degree” and “expand the number of H-1B visas for skilled foreign
workers” come with few details. The League of Conservation Voters reports that Giuliani has “no articulated position” on most of the environmental
issues it tracks. Giuliani has said, “I do believe there’s global warming,”
but he has not spelled out his response to the problem.

—ELIOT MARSHALL
JOHN MCCAIN DOESN'T HAVE ANY SCIENTIFIC TRAINING OR expertise. But he trusts the experts. They’ve told him that global warming is the most urgent issue facing the world, and that makes him a “very quick learner in spite of his record at the Naval Academy” where he ranked fifth from the bottom of his class.

McCain used his position on the Senate Commerce Committee, which he chaired from 2003 to 2005, to focus attention on the subject and has led congressional delegations to both poles to witness its impact. “He’s probably more knowledgeable [about it] than all the other candidates,” says Timothy Profeta, a former staffer for Senator Joseph Lieberman (I–CT) who now runs Duke University’s Nicholas Institute for Environmental Policy Solutions.

McCain equates environmentalism with national security. And although he has been a staunch supporter of President George W. Bush’s stance on the Iraq war, his views on climate change have triggered some sharp exchanges with Bush Administration officials. In 2002, he declared that White House science adviser John Marburger’s comments on global warming, which many scientists saw as overly cautious, had “no credibility” in light of the growing severity of the problem. In a 2005 hearing, he accused Vice Admiral Conrad Lautenbacher, head of the National Oceanic and Atmospheric Administration, of having a “complete lack of concern about future generations of Americans who are affected by climate change.” He has also called the president’s approach to global warming “disgraceful.” Last month, McCain tasted his first legislative victory on the issue, as Democrats on the Senate Environment and Public Works Committee approved a bill designed to reduce greenhouse gas emissions using a system that caps and trades emissions allowances that he and Lieberman first proposed in 2003.

As chief executive of this largely rural state from 1996 to January 2007, Huckabee persuaded a Democratic-led legislature to expand health coverage for poor children and raise taxes to improve schools and roads and unsuccessfully campaigned for teenage immigrants who did not have proof of citizenship to receive college vouchers after graduating from high school. Those positions were anathema to many of his constituents and a pleasant surprise to others. “He really was much less radical and ideological than we all expected,” says Rita Sklar, executive director of the ACLU of Arkansas in Little Rock. He also supported a bond program to help improve infrastructure at universities.

That centrisms being tested now that Huckabee is on a national stage. Seeking to expand his base among evangelicals, for example, he has promised to fight for constitutional amendments that would ban abortion and gay marriage.

As chairman of the Republican National Committee from 2003 to 2005, Huckabee initially ducked the question and instead replied, “I’m not planning on writing the curriculum for an 8th grade science book.”

Scientists in Arkansas who know Huckabee from his decade as governor say the response is consistent with his approach to many social issues: Take a strong stance but don’t impose your views on others. The former president of the Arkansas Baptist State Convention holds many staunchly conservative positions, including support for displaying the Ten Commandments in public schools and opposition to the use of embryonic stem cells for research. But when it comes time to act, Huckabee has often veered toward the center of the political road.

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McCain equates environmentalism with national security. And although he has been a staunch supporter of President George W. Bush’s stance on the Iraq war, his views on climate change have triggered some sharp exchanges with Bush Administration officials. In 2002, he declared that White House science adviser John Marburger’s comments on global warming, which many scientists saw as overly cautious, had “no credibility” in light of the growing severity of the problem. In a 2005 hearing, he accused Vice Admiral Conrad Lautenbacher, head of the National Oceanic and Atmospheric Administration, of having a “complete lack of concern about future generations of Americans who are affected by climate change.” He has also called the president’s approach to global warming “disgraceful.” Last month, McCain tasted his first legislative victory on the issue, as Democrats on the Senate Environment and Public Works Committee approved a bill designed to reduce greenhouse gas emissions using a system that caps and trades emissions allowances that he and Lieberman first proposed in 2003.

As chief executive of this largely rural state from 1996 to January 2007, Huckabee persuaded a Democratic-led legislature to expand health coverage for poor children and raise taxes to improve schools and roads and unsuccessfully campaigned for teenage immigrants who did not have proof of citizenship to receive college vouchers after graduating from high school. Those positions were anathema to many of his constituents and a pleasant surprise to others. “He really was much less radical and ideological than we all expected,” says Rita Sklar, executive director of the ACLU of Arkansas in Little Rock. He also supported a bond program to help improve infrastructure at universities.

That centrisms being tested now that Huckabee is on a national stage. Seeking to expand his base among evangelicals, for example, he has promised to fight for constitutional amendments that would ban abortion and gay marriage.
One issue dear to his heart has been the promotion of healthy living. When the Arkansas legislature rejected his proposal to use millions of dollars in tobacco-settlement funds for health care and medical research, he exercised his right as chief executive to call for a referendum, which passed handily. That effort only intensified after he was diagnosed with type 2 diabetes and shed 110 pounds.

“He would certainly be a friend” of the National Institutes of Health as president, says G. Richard Smith, who helped with the referendum and now directs the psychiatric research institute at the University of Arkansas for Medical Sciences. On the campaign trail, Huckabee has talked about funding disease-prevention efforts along the lines of the indoor smoking ban he signed into law while governor.

In a presidential debate and in a television interview, Huckabee sidestepped questions about whether human actions are behind climate change, but he supported a 2006 statement by the National Governors Association calling for more climate change research. “Our responsibility to God means that we have to be good stewards of this Earth,” he said in a May debate. That attitude, say environmental advocates, is a marked shift for someone who, as governor, declined to take sides in a court battle with Oklahoma about pollution in the shared Illinois River.

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A free-trade advocate, he has sponsored a bill to restrict taxes on Internet use. He also wants to make better use of cyberspace to advance the cause of free-dom in the tradition of Radio Free Europe. In keeping with his stance on immigration, he has also been involved in expanding H-1B visas for foreign science graduate students studying in the United States.

Sometimes the interests of science take a back seat to those of his constituents. He’s supported an amendment to the Native American Graves Protection and Repatriation Act that could make it easier to turn over ancient human remains that are unrelated to existing American Indians to tribal representatives, a step that researchers worry will make the remains off limits. And McCain has waffled on the teaching of evolution. In 2005, he told the Arizona Daily Star that “there’s nothing wrong with teaching different schools of thought [on] ... how the world was created.” But the next year, he opined that creationism should “probably not” be taught in science classes.

--CONSTANCE HOLDEN

MIKE HUCKABEE

Home State: Arkansas Web site: mikehuckabee.com

Most Recent Job: Governor Age: 52

A Republican and former assistant minority leader in the legislature, notes that Huckabee rarely socialized with or lobbied state lawmakers, unlike the famously charismatic former president. “With Clinton, even if you didn’t agree with him, you liked him,” says Hutchinson. Huckabee also has a short fuse, say several Arkansans inside and outside politics. “He was very thin-skinned and could be pretty vindictive,” says Ernest Dumas, a newspaper columnist from Little Rock who was subjected to a 5-minute televised tirade from the governor for his past criticism of Huckabee’s highway program.

Jay Barth, a political scientist at Hendrix College in Conway who has written about Huckabee’s career, says Huckabee owes his success to a conservative ideology, a winning personality, and media savvy. Huckabee is “very talented [and] never made a lot of political mistakes,” says Barth. “Arkansans never loved him the way they loved other politicians, [but] they never hated him,” either.

--JENNIFER COUZIN
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PEAKING LAST SUMMER TO A CONVENTION OF BLOGGERS IN Chicago, Barack Obama accused the Bush Administration of ignoring or distorting data to shape its decisions on science-related issues. He promised the audience that his policies would be based on “evidence and facts.” Political rhetoric? Perhaps. But some scientists who have seen the first-term U.S. Democratic senator in action say that’s how he operated as a community activist in Chicago and as an Illinois state legislator.

Eric Whitaker, a research administrator at the University of Chicago and former director of the Illinois Department of Public Health, points to a 2004 proposal before the state legislature to offer free flu shots to everyone without health insurance during a shortage of the vaccine. Obama, then chair of the Health and Human Services Committee in the state senate, pressed Whitaker and others on their advice that the shots be limited to high-risk groups. “He pushes you to defend your data,” says Whitaker. In the end, Obama was convinced by their argument that vaccinating everyone would be economically unwise and bucked the majority in voting against the proposal.

Deborah Burnet, a pediatrician at the University of Chicago who studies the connection between obesity and diabetes, says Obama displayed the same evidence-based philosophy whenever she invited the Harvard Law School grad and community organizer to lecture her class on racial disparities in health. The 30-something Obama would urge her students to think about “how to use scientific inquiry to make intelligent public policy,” says Burnet. She says she was so inspired by his message that students should apply “insights from scientifically collected evidence” to real-world problems that she began a program to help low-income residents make better nutritional choices.

Obama’s campaign sets out a number of lofty science policy goals that might be difficult to achieve in that real world, however. He’d like to double federal spending on basic research and help more Americans get on the Web by broadening Internet access. He also wants to spend $18 billion on education initiatives covering everything from early childhood learning and precollege math and science instruction to attracting more minority students into science and engineering. Ironically, he’d pay for it in part by delaying NASA’s program to return to the moon and explore Mars—a project that would employ thousands of scientists and engineers.

Like the other Democratic contenders, Obama has made global warming an important part of his campaign. He supports a market-based carbon-trading system to cut carbon emissions to 80% below 1990 levels by 2050 and wants to invest $150 billion to develop biofuels. But he’s also suffered some political bumps and scrapes along the way to that position.

Last year, for example, Obama introduced a bill to subsidize the conversion of coal to liquid fuel, arguing that it would make the United States less dependent on foreign oil. But environmentalists saw it as a sop to the multi-billion-dollar coal industry in his home state. Obama then backtracked, rigorous. I don’t think the state budged very much,” notes physicist Dennis Erickson, on detail as science adviser, who remembers being given 24 hours to clean out his desk. Despite having a year’s work go down the drain, Erickson doesn’t disagree with what the governor did. “I have nothing but good feelings toward him,” says Erickson, now retired and a contributor to Richardson’s presidential campaign.

Supporters say the incident demonstrates that the 60-year-old Hispanic politician is a principled manager, a tough negotiator, and someone who doesn’t see a conflict between national security and the environment. But some wonder if it is also the portrait of someone who acts precipitously, punishing critics and putting principles above results.
saying he would support liquefying coal only if the net carbon dioxide emissions from producing and burning the fuel were 20% lower than levels generated by petroleum-based fuels.

Reelected easily in 2006, Richardson has promised voters that he will shake up the Washington establishment. But he’s hardly a fresh face. After earning a bachelor’s and a master’s degree (in public policy) from Tufts University, Richardson spent nearly 30 years working for the federal government, first as a Democratic staffer, then as a seven-term congressman, and finally, as U.N. ambassador and energy secretary in the second Clinton Administration.

The most striking part of his résumé is his extensive, hands-on negotiations with regimes in North Korea, Iraq, and Sudan for the release of U.S. prisoners and other human-rights issues. Richardson has also taken a very aggressive stance on climate change, including calls for a 90% reduction in U.S. greenhouse gas emissions by 2050 through a cap-and-trade system, a 50% cut in oil consumption by 2020, greater reliance on renewable energy sources by utility companies, and federal subsidies to promote plug-in hybrid cars. “There is no free market when it comes to greenhouse gas emissions,” says Farquhar. “We need rules and boundaries.”

To help meet those goals, Richardson has proposed a $10 billion to $15 billion trust fund to support new energy technologies, replenished by the fruits of successful investments. But Farquhar says it’s not a honey pot for academic researchers, as the fund would pursue a more product-oriented approach than the Advanced Research Projects Agency–Energy created last summer. Farquhar says Richardson also plans to “reconfigure” DOE to deal with the twin challenges of energy independence and global warming, possibly shifting DOE’s ethanol program to the agriculture department and giving the Environmental Protection Agency a bigger role in climate change.

The lack of specifics is characteristic of someone who, in the words of one former aide, “has more ideas than time to implement them.” That’s equally true for his education platform. His response to the president’s signature No Child Left Behind program to improve elementary and secondary schools is characteristically blunt: “Scrap it.” But when asked what would replace the annual testing regimen and penalties for schools that don’t make the grade, his answer is a call for a national summit to work out the details. His promise to “hire 100,000 new science and math teachers [and] create 250 math, science, and innovation academies” likewise ignores the fact that state and local authorities, not the federal government, hire teachers and run schools.

Despite repeated campaign statements about the importance of innovation, Richardson isn’t above embracing his own scientific illiteracy as a way to identify with the average voter. In his new book on energy, Leading by Example, Richardson asserts that more people would use energy-saving technologies, including light-emitting diodes, if they were given simpler names. “Does anyone on Earth know what a diode is?” he writes. “Probably someone at the two national labs in New Mexico, but not me! And probably not you.”

—YUDHIJIT BHATTACHARJEE

Observers say the awkward shuffle reflects Obama’s relative inexperience in national politics. “It was naïve of him to think that he could side with the coal industry to please voters in his home state and not land in a frying pan on the national stage,” says Frank O’Donnell of Clean Air Watch, a Washington, D.C.–based nonprofit. Nonetheless, O’Donnell says, the senator’s green credentials are still pretty solid.

Since winning his U.S. Senate seat in 2004, Obama has continued to track health policy issues. He has proposed or supported legislation to promote embryonic stem cell research, increase research on avian influenza, and develop microbicides to protect women from HIV/AIDS. The measures suggest that Obama has retained his strong interest in applying science to public health challenges. For academic health centers, says Burnet, that means “getting the translational component going.”

—JEFFREY MERVIS
In 2000, when House Republicans wanted to pull the plug on the $1.4 billion Spallation Neutron Source (SNS) being built at the Department of Energy’s Oak Ridge National Laboratory in Tennessee, the state’s congressional delegation went to bat for the project. Fred Thompson, then one of the two Republican senators from Tennessee, was “extremely helpful” in assigning staff to work the issue, recalls physicist David Moncton, then head of the SNS project.

Last month, as Mitt Romney campaigned in Iowa, he laced his stump speeches with references to his opposition to embryonic stem (ES) cell research and abortion and his doubts about the role of humans in global warming. All those positions, plus a declaration that his Mormon faith would not dictate any decisions he might make as president, were aimed at wooing conservative Christian voters in the state.

That focus is a far cry from 5 years ago, when the 60-year-old businessman campaigned successfully to become governor of the high-tech state of Massachusetts. The new chief executive wowed biotechnology leaders and university administrators with his aggressive and no-nonsense talk about unleashing the power of research. “We were impressed by his willingness to talk about the importance of research universities in the state and national economies,” says Paul Parravano, co-director of government and community relations at the Massachusetts Institute of Technology (MIT) in Cambridge. “For a lot of people here, this was fresh and important.” As a venture capitalist with an MBA from Harvard University, Romney “understands the role of places like MIT and was very supportive,” says another university official.

During his first years as governor, researchers say, Romney talked the talk, co-chairing a national summit on innovation and telling the Massachusetts Biotechnology Council that “we want to make sure we are at absolutely the front edge” of stem cell research. He promised he would work to provide “the same kind of opportunities that you would find in any other state in America.” And he walked the walk. He launched an effort to lure more high-tech talent into the state and joined with seven other Northeastern states on a regional plan to reduce carbon dioxide emissions at power plants—the first collective U.S. effort to control greenhouse gases. He also consistently opposed efforts to introduce the teaching of intelligent design in the classroom.

But Moncton, now a professor at the Massachusetts Institute of Technology, remembers something else about his interaction with the senator on SNS, which staved off the threat and opened last year. “The issue [for Thompson] was this billion-dollar project was happening in Tennessee,” says Moncton. “There was no discussion of how intrinsically interested he was in science.”

Rick Borchelt, a longtime Democratic aide and former spokesperson for the Department of Energy lab, concurs. “He’s pretty much a cipher on science and technology,” says Borchelt.

The 65-year-old Tennessee native has played the president—as well as a military officer and a hard-nosed district attorney—during a long television and film career. He’s also been a lawyer, lobbyist, and talk-show host after coming to Washington in 1973 as a Republican staffer during the Watergate hearings. Since jumping into the race for president last summer, he has rarely addressed science issues. But Norman J. Ornstein of the American Enterprise Institute in Washington, D.C., who worked with Thompson when he chaired what was then called the Government Affairs Committee, credits him with being “knowledgeable and insightful” on the often thorny issues that came before the panel. “I found him to be quite engaged on issues he cared about,” says Ornstein. “But he was not a guy who stuck around if he didn’t need to.”
His 2-year honeymoon with the research community ended abruptly in 2005, however, just as Romney’s presidential campaign was getting started. The governor abruptly backed out of the regional emissions plan, citing its cost to consumers. He vetoed a bill passed by the Massachusetts legislature to allow ES cell research, citing his ethical concerns. Research advocates say that they never were able to sit down with the governor to discuss the bill, which was a major concern for many industry and university biologists in the state. “We were never able to engage,” says one supporter who requested anonymity. “This was an eye opener; he was changing his stripes.”

Even so, one of the strongest advocates for science in Congress, Representative Vernor Ehlers (R–MI), calls Romney “the best choice for any scientist or engineer.” The former physicist and longtime member of the House Science Committee praises the candidate as bright and unburdened by ideology, noting that “he appreciates the benefits of science.” Ehlers, who knew Romney’s late father, a former governor of Michigan, says that he is heading up a science advisory committee for the candidate.

Ehlers told Science that he expects Romney’s list of priorities to include, in particular, increased funding for math and science education and, more generally, higher spending on research of all kinds. But he speculates that Romney may choose not to be vocal on global warming, although Ehlers himself supports sharp reductions in carbon dioxide emissions. In a July 2007 issue of Foreign Affairs, Romney calls for “a bold, far-reaching research initiative—an energy revolution—that will be our generation’s equivalent of the Manhattan Project or the mission to the moon.”

Some of Thompson’s recent positions have not endeared him to researchers. Within a few hours of reading about a method of genetically reprogramming skin cells into what appear to be embryoniclike stem cells, he rushed out a statement lauding the discovery. “Today’s announcement is just one more indication that our current policy in relying only on adult cells is working,” he said on 20 November. Thompson ranked the achievement as the latest addition in “73 breakthroughs for adult and cord blood research” that he said have paved the way for new treatments for several diseases.

That tally comes from the Family Research Council, a conservative advocacy group in Washington, D.C. Many scientists regard the analysis, by the council’s David Prentice, as seriously flawed, and even Prentice says the list did not imply that those breakthroughs had led to available treatments. “[The list] not only misrepresents existing adult stem cell treatments, but also frequently distorts the nature and content of the references he cites,” wrote Steven Teitelbaum, former president of the Federation of American Societies for Experimental Biology in Bethesda, Maryland, in a letter published in Science (28 July 2006, p. 439). “Fred Thompson is misinformed,” Teitelbaum says about the candidate’s latest pronouncement.

Thompson has also climbed out on a limb in discussing climate change. “While we don’t know for certain how or why climate change is occurring, it makes sense to take reasonable steps to reduce CO₂ emissions without harming our economy,” notes an issues statement from the campaign. In March, Thompson jokingly told a radio audience that “quite a few planets in our solar system seem to be heating up a bit. This has led some people, not necessarily scientists, to wonder if Mars and Jupiter, nonsignatories to the Kyoto Treaty, are actually inhabited by alien SUV-driving industrialists.”

Gavin Schmidt, a climate modeler at NASA’s Goddard Institute for Space Studies in New York City, calls the statement “ridiculous” and says it’s based on the faulty idea of a recent warming of the sun. “We’ve been measuring the sun’s temperature for 30 years—it’s not doing anything,” Schmidt notes.

Campaign staffers declined repeated requests from Science to detail Thompson’s views on science and technology issues. And last month, at an Iowa debate in which each Republican candidate was asked whether climate change was real and caused by human activities, Thompson chose to go for a punch line rather than inform his audience. First he declined to give a yes-or-no answer. Then, after one long-shot candidate gave a rambling response that seemed to ignore the question, Thompson passed again. “I agree with Alan Keyes’s position on climate change,” he cracked to wide laughter from the audience.

—ANDREW LAWLER