Gates Foundation Picks Winners in Grand Challenges in Global Health

In January 2003, Microsoft billionaire Bill Gates challenged scientists to think big. He asked them to identify critical problems that stand in the way of improving the health of people in developing countries, and he announced that the Bill and Melinda Gates Foundation would bankroll novel research projects aimed at solving them. Last week, after reviewing 1517 letters of intent and then inviting 445 investigators from 75 countries to submit full proposals, the foundation announced the winners: 43 projects that will receive a total of $437 million. “We all recognize that science and technology alone will not solve the health problems of the poor in the developing world,” says Richard Klausner, who runs the foundation’s global health program. “What science and technology can and must do, however, is create the possibility of new vaccines, new approaches, and new cures for diseases and health conditions that for too long have been ignored.”

The 5-year grants range from $579,000 to $20 million and address 14 “Grand Challenges in Global Health” that mainly focus on R&D for drugs and vaccines, controlling mosquitoes, genetically engineered improved crops, and developing new tools to gauge the health of individuals and entire populations. Grant recipients come from 33 countries—although more than half live in the United States—and include Nobel laureates and other prominent academics as well as investigators from biotechnology companies and government research institutions. “These projects truly are on the cutting edge of science, and many of them are taking very important risks that others have shied away from,” says Elias Zerhouni, director of the U.S. National Institutes of Health in Bethesda, Maryland, who serves on the Grand Challenges board that evaluated the ideas.

Klausner, who formerly ran the National Cancer Institute (NCI), said the idea for the Gates Foundation’s Grand Challenges grew out of a meeting he had with Gates in the fall of 2002. Says Klausner: “He asked me an interesting question: ‘When you were running NCI, did you have a war room with the 10 most critical questions, and were you monitoring the progress?’” They also discussed German mathematician David Hilbert, who in 1900 famously spelled out 23 problems that he predicted “the leading mathematical spirits of coming generations” would strive to solve.

Gates announced the Grand Challenges initiative at the World Economic Forum in Davos, Switzerland, in January 2003, committing $200 million from his foundation. More than 1000 scientists suggested ideas that led the initiative’s board to select 14 grand challenges (Science, 17 October 2003, p. 398). After sifting through the letters of intent and, subsequently, the full proposals, Gates decided to up the ante: The foundation contributed another $250 million; $27 million more came in from Britain’s Wellcome Trust and $4.5 from the Canadian Institutes of Health Research.

Researchers applying for grants had to spell out specific milestones, and they will not receive full funding unless they meet them. “We had lots of pushback from the scientific community, saying you can’t have milestones,” says Klausner. “We kept saying try it, try it, try it.” Applicants also had to develop a “global access plan” that explained how poor countries could afford whatever they developed.

Nobel laureate David Baltimore, who

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Challengers. Richard Klausner (left) and Bill Gates confer at the 2003 World Economic Forum, where the initiative was launched.

Researchers Consider Codes of Conduct

Scientists should adopt codes of conduct aimed at preventing the development of biological weapons. That was the consensus declared this month in Geneva at the end of a 12-day meeting of experts from 85 countries that have signed the Biological and Toxin Weapons Convention. Such codes may help raise awareness and set norms for researchers in sensitive fields, participants said. Some existing codes of conduct leave out the issue of biological weapons, and only a few scientific organizations now have such guidelines.

Although the meeting was not set up to reach any agreement, it should “help build momentum” for wider adoption of codes, says bioterror expert Ronald Atlas of the University of Louisville in Kentucky.

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Germans Resolve Funding Stalemate

BERLIN—Top universities and science organizations in Germany are applauding a long-awaited science funding boost. The 5-year, $2.3 billion “Excellence Initiative,” which is designed to propel several institutions to world-class status, was blocked for more than a year by political fights between state and federal leaders (Science, 22 April, p. 483). The prospect of early elections this fall and a minor rework of the proposal apparently helped break the deadlock late last month. Proposals from universities are due in September, and funds are set to flow next year. The agreement also includes a minimum 3% yearly budget increase through 2010 for Germany’s nonuniversity research organizations such as the Max Planck Society.

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Updates

- National Institutes of Health Director Elias Zerhouni last week extended employees’ deadline for reporting stock holdings by 3 months to 3 October, with a 2 January 2006 deadline for divesting. It’s the second extension since a new ethics policy was announced in February.

- The Pasteur Institute announced this week that its controversial Director Philippe Kourilsky will leave on 31 July. The institute’s board of directors had decided this spring (Science, 22 April, p. 493) to make the change and has begun a search for his replacement.

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*The funded projects are listed and described at www.grandchallenges.org.
won a $13.9 million award to engineer adult stem cells that produce HIV antibodies not found naturally, was one of the scientists who pushed back. “At first, I thought it was overly bureaucratic and unnecessary,” said Baltimore, president of the California Institute of Technology in Pasadena. “But as a discipline, to make sure we knew what we were talking about, it turned out to be interesting. In no other grant do you so precisely lay out what you expect to happen.”

Other grants went to researchers who hope to create vaccines that don’t require refrigeration, modify mosquitoes so they die young, and improve bananas, rice, and cassavas. In addition to HIV/AIDS, targeted diseases include malaria, dengue, tuberculosis, pertussis, and hepatitis C. Many of the projects involve far-from-sexy science. “We had this idea we were supposed to be hit by bolts of lightning,” says Klausner. “But this is about solving problems. These things aren’t often gee-whiz, they’re one area applied to a new area.”

Klausner says this is not a one-shot deal. “We’re not being coy with people,” he says. “If they hit all their milestones and it looks spectacular, we would expect them to come back and ask for future funding.”

—Jon Cohen

ECOLOGY

Flying on the Edge: Bluebirds Make Use of Habitat Corridors

In many parts of the world, landscapes are turning into isolated fragments of habitat. Conservation biologists and land managers often try to link these patches via connecting strips of habitat, in theory, give animals better access to food and mates. But testing whether, and how, these so-called corridors work has been difficult.

On page 146, a team led by ornithologist Douglas Levey of the University of Florida, Gainesville, and ecologist Nick Haddad of North Carolina State University in Raleigh describes the largest replicated, controlled study of corridor efficacy and reports that bluebirds prefer to travel along the edges of these habitat connectors. The study also shows that small-scale observations of behavior can be used to predict how animals move through larger landscapes. Such results have conservation biologists excited. “This provides a lot more confidence that corridors are working as hypothesized,” says ecologist Reed Noss of the University of Central Florida in Orlando.

The study team created eight experimental sites in the pine forests of western South Carolina to test how corridors are used. Within each, five patches of forest were cut down to make the open habitat that eastern bluebirds (Sialia sialis) prefer. The central “source” patch, 100 meters by 100 meters, was connected to another “receiver” patch by a 150-meter-long corridor. Each site also had three patches isolated from the source, at least one of which had “wings”—dead-end corridors on either side—in order to test the idea that even unlinked corridors help organisms find patches of natural habitat. “It’s a very clever experiment,” comments Stuart Pimm of Duke University in Durham, North Carolina.

The middles of the source patches were planted with wax myrtle bushes, whose fruits are a major food resource for the bluebirds. For two field seasons, Levey’s postdoc Joshua Tewksbury, who is now at the University of Washington, Seattle, and others tracked single birds in the source patch as they flew from the wax myrtle bushes to other perches within patches or the surrounding forest. For each hop, until the birds flew out of sight, they noted the direction and distance traveled—usually no more than 20 meters—and the resting time at each perch. The birds’ movements weren’t totally random; when they encountered an edge of a patch, for example, they most often flew parallel to it.

The researchers then developed a computer model in which short bird flights mimicked the observational data were stitched together to simulate a 45-minute journey—the estimated time it takes a bird to digest fruit and excrete seeds—that took a simulated bird sometimes more than 250 meters from its starting point. After tens of thousands of runs, the model predicted that birds in a source patch were 31% more likely to end up in the model predicted that birds in a source patch as they flew from the connected receiver patch than in unconnected ones.

To test the model, the researchers sprayed a fluorescent solution onto wax myrtle fruit in the source patches. Each week, they checked pole-mounted flowerpots in the four surrounding patches for any bird defecations with fluorescent seeds. Although they couldn’t identify what kinds of birds had deposited the seeds, bluebirds were the most common species to perch over the pots.

After analyzing 11,000 defecations, they found that seeds were 37% more likely to occur in the connected receiver patch than in the isolated ones, backing up the model prediction. Also mirroring the model, there was no significant difference in seed number between the isolated patches that had the dead-end wings and those that did not, suggesting that the birds weren’t using that type of corridor to find habitat patches.

Experts caution that it’s difficult to generalize these results about corridor use to other species. But the basic point that small-scale observations can reliably inform landscape design is good news for those who can’t afford to run large experiments. “It is comforting to conservation planners that one of the first attempts to scale up has proven quite successful,” says Paul Beier of Northern Arizona University in Flagstaff.

The observations also provided insight into how bluebirds use corridors. Instead of flying down the middle, the bluebirds tended to stay along their edges in the pine plantations. The trees there may offer higher perches than the shrubby opening or better protection from hawks. One implication, for bluebirds at least, is that the width of a corridor or the quality of its habitat may not matter as much as that it has edges. Levey suspects that this edge effect holds true for other animals. But Beier points out that the experimental habitat differs from most corridors, which are usually strips of forest running through urban or agricultural land.

—Erik Stokstad
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