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 that, 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.

Well-connected. Bluebirds (*inset*) used corridors to travel between patches of habitat (white rectangles) experimentally created in a pine forest (red).

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 mimicking 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 connected 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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