The structural work may have practical implications as well. If researchers can find differences between the way human pol II and its bacterial and fungal counterparts interact with either DNA or associated proteins, they may be able to find antibiotics that work by specifically inhibiting pathogen polymerases. Another possibility is to look for drugs that prevent transcription factors involved in stimulating cell growth from binding to pol II, as these may be potential targets for cancer therapy.

Meanwhile, the members of Kornberg's team can pride themselves on a feat that was judged impossible just a few years ago. "Until a relatively short time ago," Geiduschek says, "pol II was regarded as beyond contemporary reach." **–JEAN MARX**

ECOLOGY

Birds Weigh Risk Before Protecting Their Young

As every parent knows, what's best for the children may not always be best for the parents, be it a movie choice or where to spend hard-earned money. Feathered parents can face an even starker decision: whether to trade their progeny's survival for their own.

And cold-hearted though it may seem, birds are sometimes willing to sacrifice their young to save themselves so they can breed again. New work, reported on page 494, clearly shows that breeding birds factor in both the number of their young and their own likelihood of surviving when deciding whether to risk delivering food to the nest in the presence of a predator. This behavior even varies according to what type of threat a specific predator poses. "Birds have the cognitive ability to react [differently] to certain kinds of predators," says Jeffrey Brawn, a population ecologist with the Illinois Natural History Survey in Champaign.

The work, by Cameron Ghalambor, now at the University of California, Riverside, and his colleague Thomas Martin at the U.S. Geological Survey in Missoula, Montana, probed a long-suspected difference between birds in the Northern Hemisphere and their counterparts in the tropics and the Southern Hemisphere: Northern birds tend to lay more eggs than do similar species in the South.

For these studies, Ghalambor and Martin first analyzed preexisting data on number of young and adult survival of some 182 species, comparing birds from Europe and North America with those from New Zealand, Australia, and South Africa. They also probed these characteristics in more detail in two bird populations on opposite sides of the Equator, in Arizona and in Argentina. "I've never seen comparisons over such a broad geographic area," comments Amy Krist, an evolutionary biologist at the University of Hawaii, Hilo.

Both the preexisting data and those from the Argentina and Arizona sites confirmed the disparity in the number of eggs laid per season between northern and southern populations. Ghalambor argues that the difference may be explained by the fact that northern birds sometimes live just one season, so they "invest more in reproduction" by laying more eggs the one chance they have.

Ghalambor and Martin then tested whether that investment also results in differences in the risks northern and southern populations run to protect either themselves or their young. They looked at the parents' willingness to return to the nest to feed their chicks when confronted with a predator. The researchers compared five Argentinian species—a flycatcher, a thrush, a wren, a sparrow, and a warbler—to their closest relatives in Arizona.

Parenting strategies. Although similar in many ways, these two robin species from Arizona (*left*) and Argentina (*above*) differ in the amount of risk they will take for their young.

For each species, they tested the parents' reactions to recordings of calls from a hawk, which attacks adults; a jay, which attacks chicks; or a nonthreatening stuffed tanager. They attempted to test each bird call on each set of parents and observed them for 90 minutes both before and after. All told, they made 175 presentations to 61 nests.

As expected, birds from both hemispheres reduced their food deliveries when they heard and saw either the hawk or the jay. "It's been known for a while that birds avoid going to nests when they know they are being watched," says Robert Ricklefs, an ecologist at the University of Missouri, St. Louis. But there were some intriguing differences.

Take the house wren. The wrens in Arizona averaged 5.8 chicks per nest, while their southern counterparts averaged just 3.7. The jay, which attacks chicks, spooked the Arizona wrens more than those in Argentina, inciting a greater reduction in feeding. In contrast, the Argentinian birds were less concerned about leading the jay to their nests but were more leery of the hawk, very quickly abandoning feeding their chicks to protect themselves.

"There is a trade-off between survival and reproduction," explains Ghalambor, in which the northern birds that are unlikely to survive the winter have put all their eggs in one nest, so to speak, and do everything they can to care for those eggs. Southern birds hedge their reproductive potential, producing fewer eggs at one time but breeding more than once. Hence, they value their own survival more than that of their chicks.

Biologists have long thought that some traits evolve to compensate for other traits that might compromise an organism's reproductive potential, says Brawn. Yet demonstrating how characteristics such as nest size and risk-taking behavior vary in different environments to contribute to the species' survival has been tough. Ghalambor and Martin, says Brawn, have corroborated "one of the central principles of life history theory."

–ELIZABETH PENNISI

MICROARRAYS

Data Standards On the Horizon

Microarrays offer researchers a tantalizing way to reap the bounty of genome sequencing—if the torrent of data they generate can be managed properly. In an effort to tame the flood, a group of scientists is almost ready to propose standards for describing and sharing microarray data. Even so, researchers and journal editors are not very far along in figuring out how to enforce them.

Microarray data won't reach their potential until researchers can compare their own results with those of experiments in other

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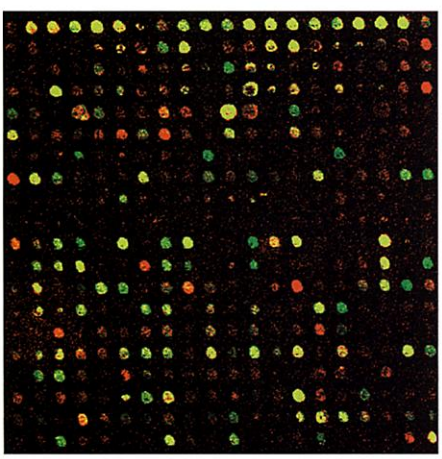
labs. But right now there is no standard format for transferring microarray data between scientists and no rules for how a microarray experiment should be described in a publication. In 1999 a group of bioinformaticists and biologists met in Cambridge, U.K., and formed five working groups to tackle the problem. Last month, at the third such meeting,* two of those groups announced that they are close to submitting recommendations on defining what data should be recorded and the format for transferring and archiving them. "It now has a momentum of its own," says Alvis Brazma of the European Bioinformatics Institute, who convened the first meeting and has seen attendance more than triple, to 300 participants.

The Minimal Information About a Microarray Experiment (MIAME) working group presented a final draft of a document that defines how to describe not only the gene expression data, but also the sample and experimental conditions under which the data were collected. The working group hopes to submit the MIAME document for publication in the next 2 to 3 months in what Brazma calls "MIAME version 1.0."

A second challenge involves creating a tagged-text computer format for transferring and archiving microarray data. One proposal comes from a working group led by Paul Spellman of the University of California, Berkeley. Two biotech firms have also individually crafted proposals for a software standard: microarray developer Rosetta Inpharmatics Inc. of Kirkland, Washington, and NetGenics Inc., a bioinformatics software company in Cleveland, Ohio. The three have agreed to submit a revised consensus proposal to a software standards organization by 18 June. "People are putting aside their egos" in the quest for a single standard, says Doug Bassett, senior director of biosoftware products and services for Rosetta.



Seeing spots. Standards would help scientists share and interpret microarray data.

CREDITS: (TOP TO BOTTOM) BEPPOSAX; NIH

It will then be up to journal editors to enforce the standards. Brazma hopes that eventually authors will be required to deposit data in a public database—but not until it's clear to everyone that the standards capture the right information and don't present a burden to researchers submitting the data, he and others say. Establishing standards is "something everyone realizes needs to happen," says Mike Cherry of Stanford University, who organized this year's meeting, "There'll be a lot of complaints if it's not done well." –R. JOHN DAVENPORT

STEM CELLS

NIH Pulls Plug on Ethics Review

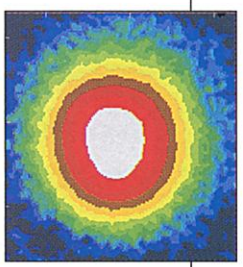
Advocates for research with human embryonic stem (ES) cells are worried by the latest twist in the cells' political story. Last week the National Institutes of Health cancelled its planned meeting of the panel that is supposed to determine whether a given stem cell line complies with NIH's ethical guidelines (*Science*, 6 April, p. 27). Because the NIH can't fund projects until their cell lines have been approved by the panel, the cancellation delays indefinitely federal funding of human ES cell research.

ES cells have the potential to develop into any cell type in the body, and many scientists would like to discover how to use them to treat intractable diseases such as diabetes or Parkinson's. However, the work is controversial because the cells are derived from week-old human embryos. Although a clause in the law that funds NIH prevents the agency from funding research that would harm or destroy an embryo, a lawyer at the Department of Health and Human Services (HHS) ruled in 1999 that because ES cells—which can grow ad infinitum in culture—are not themselves embryos, the NIH could fund work with cells that were derived by privately funded researchers or researchers overseas. The Bush Administration is reviewing that ruling.

Meanwhile, the Human Pluripotent Stem Cell Review Group was to meet on 25 April to review at least one cell line, derived with private funds by Australian researchers Martin Pera and Alan Trounson and their colleagues. However, NIH said last week that the meeting had been cancelled. "The [HHS] department told us inasmuch as they're conducting a review, it was premature for the review group to meet to assess compliance" with the guidelines, said NIH spokesperson Anne Thomas.

ScienceScope

Life Sentence X-ray astronomers are cheering a decision to give BeppoSAX, an Italian-Dutch x-ray satellite, a new lease on life. The Italian space agency ASI last week extended operation of the spacecraft, which was due to die at the end of the month, to 1 May 2002. The reprieve is "just marvelous," says astronomer Stan Woosley of the University of California, Santa Cruz.



BeppoSAX, launched 5 years ago, hit the headlines in 1997 when its wide-field x-ray cameras enabled astronomers to pin down gamma ray bursts (right), the most violent explosions in the universe (*Science*, 23 May 1997, p. 1194). Keeping it alive gives astronomers access to two gamma ray trackers, as NASA launched its HETE-2 orbiter last year.

BeppoSAX is down to just one working navigational gyroscope, but even if it fails officials expect the craft to remain operable due to an upcoming software fix. And if BeppoSAX stays healthy, its mission could be prolonged even further.

How Big? Would a larger, longer grant improve the quality of YOUR research? Principal investigators and their institutions will be able to take a swing at that softball question this year as part of a survey designed to improve grants management at the National Science Foundation (NSF). The survey is intended to help the government "determine the 'right' grant size for the various types of research [NSF] funds," according to the president's recent 2002 budget request to Congress.

NSF officials hope it also will lead to double-digit budget increases in 2003 and beyond. NSF director Rita Colwell has already calculated that National Institutes of Health–sized awards would require a doubled budget, but White House officials have complained that such calculations are based on anecdotal rather than hard evidence.

The community stands ready to pitch in. At last week's NSF budget briefing, Alan Kraut, executive director of the American Psychological Society, asked Colwell: "What can we do to help you convince [the White House]?"

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* The Third International Meeting on Microarray Data Standards, Annotations, Ontologies, and Databases, 29–31 March, Stanford University, Palo Alto, California (www.mged.org).