forts will need to focus on habitats used by these species throughout their annual cycle," says Marra.

Although researchers have long sought to link northern and southern populations of migratory birds, that goal has been as elusive as a tiny songbird in a forest canopy. Songbirds are too small to carry radio transmitters, and although thousands have been color-banded, only rarely has one been identified in both the north and south.

The isotopic method offers a clever solution. Marra and Holmes measured levels of the naturally occurring stable isotope carbon-13. They capitalized on the fact that plants in certain habitats, such as wet mangrove or wet lowland forests, have less C-13 than do plants typical of dry scrub, due to differences in water use efficiency and photosynthetic pathways. This isotopic signature is passed up the food chain to plant-eating insects and insect-eating birds and shows up in their blood.

Marra captured, weighed, and bled redstarts at the beginning and end of the winter season in Jamaica and Honduras. As expected, birds that had wintered in the mangroves and wet lowland forests had low levels of C-13, while birds that had wintered in dry scrub had high levels. Furthermore, the wet forest birds—which were 65% male—had maintained or gained weight, while the scrub-dwellers—which were 70% female—had lost up to 11% of their body mass and had elevated levels of the stress hormone corticosterone. Marra also witnessed the tactics older males use to retain control of choice habitat. In as yet unpublished work, he put decoys into the mangroves and watched the males dive-bomb them; that aggression apparently forces females and younger males into the scrub.

Winter hot spot. Redstarts find plenty of insects in black mangrove swamps like this one in Jamaica, but many mangroves are in decline.

CREDIT: (LEFT) PETER P. MARRA/SMBC/NATIONAL ZOOLOGICAL PARK

The team predicted that because of their better physical condition, birds wintering in wetter habitats would be able to get an early start on the long spring flight to northern breeding grounds, where they would then have the pick of real estate for courting and nesting. Indeed, previous studies have shown that early comers of both sexes have more young. Birds that wintered in the scrub were predicted to leave late, setting them up to be losers in the mating game, says Marra.

To test these predictions, he captured and bled arriving redstarts in the New Hampshire forest. Sure enough, he found that early arrivals—singing and ready to mate—carried the wet forest signature; they were mostly older males. Later arrivals carried the dry scrub signature and were typically scraggly younger males or females. Among the late arrivals, males were probably worse off than females, who could pair up as the second mate of an established male. It all points to the importance of winter habitat for redstart populations, suggesting that "when choice habitat is limited, individual fitness and ultimately populations can suffer," Holmes says.

That's important news for conservationists. Dramatic population fluctuations in migratory songbirds over the past 30 years have raised alarms. Although the American redstart is generally holding its own, populations in the Adirondacks and New Hampshire have been declining by about 3% per year. The take-home message, says behavioral ecologist Sidney Gauthreaux of Clemson University in South Carolina, is, "You may do everything on the breeding grounds to protect these Neotropical migrants, but we can still lose the species by having the winter habitat destroyed." For example, mangroves, which shelter large numbers of migratory birds, are in decline worldwide; the Caribbean lost about 10% of its mangroves in the 1980s and continues to lose about 1% a year, says biologist Elizabeth Farnsworth of Harvard University.

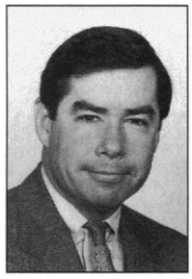
As prime habitat grows scarce, more and more birds will be forced into the scrub. "When good winter habitat is limited, even those birds that survive will be worse off and have less breeding success,"

ScienceScope

NEW FACES ON FUNDING PANEL

Washington wonks are weighing how a leadership shuffle on Congress's powerful House Appropriations Committee will influence R&D budgets.

The ascension of former Chair Bob Livingston (R–CA) to Speaker of the House prompted a spate of seat shifting on the committee, which approves all federal spending. Florida Republican Bill Young inherited the top spot, while James Walsh (R–NY) steps in as head of the subcommittee that sets spending for the National Science Foundation, EPA, and NASA.



Walsh

Although Livingston and Walsh haven't been outspoken supporters of research spending, both are well versed in science politics, congressional aides say. Predicts one: "There will be a significant change is style but not substance. These are pragmatic leaders the science community can work with."

WILDLIFE SCIENTISTS LEFT OUT IN THE COLD

The buckshot is flying over a proposal to strip some scientists of their vote in determining which of Canada's species are endangered.

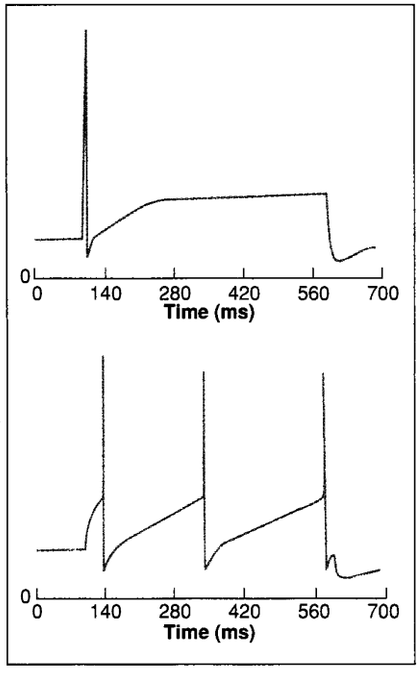
Late last month, as part of a new national conservation policy, provincial wildlife ministers proposed elevating the 25-member Committee on the Status of Endangered Wildlife in Canada, which identifies species in need of legal protection, from an advisory to a stronger decision-making panel. As part of the makeover, they want to reduce the number of voting members, which would deprive six scientists of their balloting rights. They also want to replace three other researchers nominated by conservation groups with government appointees. Government officials say the changes are needed to streamline operations.

Conservationists charge that the move will reduce the panel's diversity and politicize deliberations. But there are signs that the ministers may reconsider their plans prior to producing a final draft in March. "It's not over till it's over," says Steve Curtis of Environment Canada.

neurons are more excitable than others, firing many more action potentials in response to a given stimulus.

In earlier studies, McKinnon and Dixon's team specifically tested neurons for the M-current, the flow of potassium ions across the membrane under conditions in which M-channels would be the only potassium channels open. They found that the less active neurons have M-channels while the more active neurons lack them. That made sense, because M-channels let positively charged potassium ions flow out of the neuron during the period leading up to an action potential. That reduces the neuron's excitability by countering the inward flow of ions triggered by neural signals.

The Stony Brook team used their knowledge of which neurons lack M-channels to help them search for the channel's protein components. In both types of neurons they screened through the RNA messages that indicate which proteins the neuron is making, to see whether any of the known potassium channel proteins were made only in the M-channel–containing neurons. KCNQ2, a potassium channel subunit that had not been linked to any known channel, fit the bill. In further experiments the researchers injected RNA encoding the different KCNQ subunits into frog egg cells and showed that KCNQ2 combines with another subunit, KCNQ3, to make a channel that behaves exactly like the M-channel.



Excitable. Sympathetic neurons missing the M-channel (lower panel) fire more than those that have the channel (upper panel).

CREDIT: DAVID MCKINNON

This was not the first time the two proteins had attracted attention. Earlier this year, while the Stony Brook team was doing those experiments, a team at the University of Hamburg in Germany and another at the University of Utah reported that mutations in the genes that encode KCNQ2 or KCNQ3 cause a hereditary form of epilepsy. Finding out that the two proteins encode the M-channel "really makes sense," says Thomas Jentsch, a member of the Hamburg team, because "the M-channel has been shown to control neuronal excitability," and epileptic seizures occur when neurons become uncontrollably excited.

The prospect of controlling seizures via the M-channel already has drug company scientists intrigued. They "were all over the poster," McKinnon says, when he presented his team's work at the annual meeting of the Society for Neuroscience in Los Angeles last month. DuPont neuroscientist Barry Brown, a co-author on the paper, says drug companies can now use the subunits to screen drugs. "If you could find a drug that actually opened or enhanced the activity of M-currents, it may be a good antiepileptic drug," he says.

In addition, several compounds developed by DuPont as memory enhancers for Alzheimer's patients had already turned out to block the M-current. "That implies that the M-current is also involved in cognition," says Neil Marrion, a neuroscientist at the University of Bristol School of Medical Science in the U.K. "If you look at [animal models of] Alzheimer's, cell firing is actually dampened in the hippocampus," he notes. The cognition-enhancing drugs may work at least in part, he suggests, by "jazzing up" the excitability of neurons in this important memory area.

The DuPont drugs, along with the subunits and their genes, also provide a new set of tools for neuroscientists who study neural excitability. For example, the neurotransmitter acetylcholine enhances neurons' response to its excitatory signals by activating receptors that turn off the M-channel. But after years of research, no one has identified the intracellular messenger, triggered by acetylcholine, that turns the channel off. Having the subunits in hand "will help people to investigate what the messenger might be," says Marrion, who has studied the M-channel for a decade.

For instance, they can look for certain hallmark amino acid sequences in the channel proteins that provide clues to the kinds of regulatory molecules that act on the channel, mutate those amino acids to see the effects of losing that regulation, and even study the effects of altered forms of the M-channel in transgenic animals. "This work opens up whole new avenues," Marrion says.

–MARCIA BARINAGA

FORECAST: FOG AHEAD ON JOB FRONT

A decade after lambasting the National Science Foundation (NSF) for botching a study of the science job market, Congress has asked the agency to once again take on the politically risky task of predicting how many high-tech workers the United States will need over the next decade.

The request is part of an ongoing debate over the impact of a new law designed to boost the number of foreign workers filling high-tech jobs. But social scientists warn that predicting labor markets is a tricky business. "It's extremely difficult, if not impossible, to project demand," says Jeanne Griffith, head of an NSF division that tracks demographic trends.

Nonetheless, such projections can spark a political firestorm, as NSF learned after a 1987 study, led by Peter House, warned of a coming "shortfall" of several hundred thousand scientists. After the forecast proved false, lawmakers questioned the agency's reputation for dispassionate analysis (*Science*, 14 February 1992, p. 788). NSF overcame that stain on its reputation, however, and "there is no truth to the rumor that [House] is being brought back to head the [new] study," says one NSF wag.

STEALTH PLAN TO DO AWAY WITH PEER REVIEW

Australian academics are upset about an internal government proposal to replace the Australian Research Council's peer-review system with block grants divvied up by individual universities.

The proposal, developed by the education ministry and first reported last month in *The Australian* newspaper, calls for moving away from peer review and recommends that graduate scholarships go directly to students rather than to universities. It also suggests using new performance measures to decide how to allocate research funds.

Alarmed academics, however, warn that abandoning peer review would undermine quality control and put smaller institutions at a disadvantage in the funding hunt. "These damaging and ill-considered ideas threaten the standard and standing of basic research in Australia," says Peter Cullen, president of the Federation of Australian Scientific and Technological Societies. The proposal is expected to be made public in the next few weeks.

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