

fell by about 23 percent as water passed through heaters, Timothy A. DeVol and Richard L. Woodruff Jr. of Clemson University now find.

Their calculations, presented in the December 2004 *Health Physics*, indicate that residues from the water left each heating tank with up to 69 grams of uranium, depending on the tank's age and the household's water use.

Although the radioactive tank deposits pose little or no risk to homeowners, DeVol says, they do justify classifying the water heaters as naturally occurring radioactive waste (*SN*: 10/26/91, p. 264). Such materials can pose hazards if the tank's metal is later scrapped and recycled. For now, they're not subject to regulation by the federal government or most states. —J.R.

ZOOLOGY

Sparrows learn song from pieces

To learn a song, young white-crowned song sparrows don't need to hear the entire tune straight through. Hearing it in two-phrase bits will do. If the order of phrases in a pair is reversed—BA and DC instead of AB and CD for instance—the sparrows put together the song in reverse, Gary J. Rose of the University of Utah in Salt Lake City and his colleagues report in the Dec. 9, 2004 *Nature*. Play the same phrases without pairing them, however, and the young birds end up singing a jumble.

Researchers have known that songbirds need to hear singing very early in life if they're going to learn songs correctly. Youngsters first babble softly and then sing muddled but more-recognizable song snatches until full adult singing emerges. For years, scientists have been working to tease out the details by which early exposure to song creates a neural template for a lifetime of avian crooning.

Rose and his colleagues created recordings with various combinations of sparrows' five basic song snippets—single phrases or varying pairs of those snippets, such as DE, CD, BC, and AB. The researchers then played complete but jumbled song versions to nine nestlings that had been brought into the lab while still too young to react to singing. As the birds matured, they pieced

together the elements into songs of nearly normal length whose specific melodies depended on the snippets they had heard.

The variation supports the idea that early musical exposure influences combination-sensitive detectors in the birds' brains, says Rose. Studying how birds learn songs, he suggests, may offer insights into various learning sequences for other movements. —S.M.

BIOMEDICINE

Antibiotics could save nerves

Penicillin and its family of related antibiotics may soon have a new use: protecting nerve cells from chemical damage.

Neurotransmitters, such as glutamate, excite neurons in the brain so that electric signals can pass from one neuron to the next. However, too much glutamate outside neurons can overstimulate and kill nerves, a factor in amyotrophic lateral sclerosis (ALS) and some other diseases. To prevent glutamate from building up outside neurons, proteins called transporters shuttle the chemical back inside cells.

Pharmaceutical developers have had little success in formulating drugs to make transporters more efficient in clearing out glutamate, says Jeffrey Rothstein of Johns Hopkins University in Baltimore. "We said, 'Let's see if any existing drugs have properties that we didn't know about,'" he explains.

Rothstein's team tested 1,040 U.S. Food and Drug Administration-approved drugs to see whether they would increase the abundance of transporters in slices of rat spinal cord kept alive in lab dishes. Only penicillin and its relatives, a drug family

known as beta-lactam antibiotics, significantly raised the transporter concentrations in this neural tissue, the scientists report in the Jan. 6 *Nature*.

One of these antibiotics, ceftriaxone, showed particularly promising results. Mice that exhibited the symptoms of ALS and that received daily injections of the drug survived 10 days longer than mice that didn't receive the drug. A clinical trial scheduled for this spring will examine whether similar antibiotics can lengthen the survival of people with ALS. —C.B.



OLD ORDER A white-crowned sparrow can piece together a proper song if it hears the pieces in pairs.