

When North American birds diverged

The last glacier to scrape across North America, retreating some 10,000 years ago, shaped the character of the continent in numerous ways, both physically and ecologically. Many species of songbirds—bluebirds and tanagers, for example—have distinct eastern and western populations that seem to have diverged when the glacial divider went up in the midsection of the continent.

Or so biologists thought.

In his studies of bird evolution, Robert M. Zink of the University of Minnesota in St. Paul noticed a few years ago that songbirds which should be closely related if they had separated only during the last glacial period had a surprisingly large number of genetic differences. "It didn't seem right," he says.

A more extensive analysis of 35 pairs of songbird species has clinched that hunch. It indicates that many North American songbirds diverged much earlier, as long ago as 5 million years. Zink and his colleague John Klicka report their findings in the Sept. 12 *SCIENCE*.

The researchers used data derived from a segment of DNA from mitochondria, organelles within the birds' cells. The rate at which mitochondrial DNA mutates is often used as a way of telling evolutionary time: The greater the number of differences in a sequence of DNA shared by two lineages, the longer the time since the two split from their ancestral stock.

Such molecular clock analyses often clash with standard ideas about the timing of a species' origin (*SN*: 6/28/97, p. 400). The Minnesota researchers note that molecular clocks can be "contentious," since the rate at which DNA changes may not be constant over time.

Still, the researchers found one pair of birds whose mitochondrial DNA fits a pattern of recent divergence, about 35,000 years ago: namely, the timberline and Brewer's sparrows. In contrast, the Steller's jay and blue jay appear to have diverged more than 5 million years ago.

On average, a mitochondrial DNA difference of 5.1 percent separated the pairs of eastern and western songbirds, suggesting that they have been evolving separately for a whopping 2.5 million years. Zink and Klicka would have expected to see only a 0.5 percent difference if the birds had been separated sometime during the last glaciation, about 100,000 years ago.

Zink doesn't discount the force of earlier glaciers in songbird speciation—"it's just that the most recent ones don't make sense."
—C.M.



East meets west: Many songbirds in North America have evolved into eastern and western variants. Scientists thought the last glaciation was responsible, but a genetic analysis indicates a much earlier divergence for many of the birds, such as these pairs (left to right): MacGillivray's and mourning warblers, black-headed and rose-breasted grosbeaks, western and eastern bluebirds, and chestnut-collared and Lapland longspurs.

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Teens, insulin, and heart disease

Most adolescents have more urgent matters on their minds than the risk of heart disease decades hence. A new study suggests, however, that teens who respond sluggishly to the hormone insulin may run a greater risk of heart attacks later in life.

Adults with insulin resistance have an increased risk of heart disease (*SN*: 9/16/89, p. 184). Now, researchers at the University of Minnesota Medical School in Minneapolis report a statistical association in teenagers between insulin resistance and concentrations of fats known to be associated with heart disease.

Alan R. Sinaiko and his colleagues studied 85 boys and 96 girls between the ages of 11 and 14. The researchers gave them doses of insulin and the sugar glucose to test for insulin resistance, in which cells ignore insulin's message to take up the sugar. The body responds to the continued presence of glucose by pumping out more insulin, which some researchers suspect may play a role in the development of heart disease.

None of the teenagers showed evidence of heart disease, Sinaiko says, but those with insulin resistance typically had higher concentrations of triglycerides and lower amounts of high-density lipoproteins in their blood than did those without insulin resistance. Presenting his team's findings last month at the American Heart Association's 51st annual conference on high blood pressure, held in Washington, D.C., Sinaiko warned that these risk factors may presage heart disease later in life.

"This is one study suggesting that perhaps we can identify at-risk people at a very young age," comments Theodore A. Kotchen of the Medical College of Wisconsin in Milwaukee.

Sinaiko and his colleagues hope that insulin resistance will serve as a red flag for the increased threat of cardiovascular disease. If at-risk adolescents can be taught to eat a low-fat diet and exercise faithfully, says Kotchen, they may be able to keep their hearts healthy well into the future.
—K.F.

Heart risk and the sex hormones

Ancient healers believed a perfect balance of bodily fluids kept disease away. Modern studies suggest the right mix of sex hormones can keep cardiovascular risk factors at bay.

Katherine Sherif at Allegheny University of the Health Sciences in Philadelphia and her colleagues studied 93 black women with an average age of 30 who were participating in a blood pressure study. The team measured concentrations of the male and female sex hormones—testosterone and estrogen—in the women's blood.

Hormone concentrations in all of the women fell within the normal range, but women with higher ratios of testosterone to estrogen were more likely to have higher blood pressure, insulin resistance, and higher concentrations of low-density lipoprotein, the so-called bad cholesterol. All three factors put people at increased risk of heart and blood vessel disease, including strokes and heart attacks.

Previous research had linked a high testosterone-estrogen ratio to such risk factors in white and Hispanic women, but this is the first such study in black women, notes Sherif. She presented her team's findings at the American Heart Association's 51st annual conference on high blood pressure, held in Washington, D.C., last month.

Because black women run a higher risk of heart disease and stroke than women of other races, the researchers now plan to compare sex hormone ratios by race. The results raise concerns about testosterone-containing drugs prescribed to relieve symptoms that can occur during menopause, Sherif says. Such drugs are being touted as an antidote to hot flashes, but the new study suggests that tipping the balance of sex hormones may prove dangerous to the heart, she says. "If just a tiny bit of testosterone in relation to your estrogen is too much, what's going to happen with these drugs?" Sherif asks.
—K.F.