legislators last year experienced the value of CRS immediately. In contrast, he says, "the opportunity to know OTA well came as you served more time, rose in the leadership, and became committee chairmen." These leaders may be influential, he says, but there were too few of them when the fate of the agency came to a vote this summer.

After getting their proverbial pink slips in mid-August, OTA employees expedited their work schedules to complete 27 additional analyses, filling some 4,200 pages. Ten books—1,500 pages of camera-ready text—were finished and sent to the printer only last week.

What made it possible, Herdman explains, was 60 days of severance pay and the commitment of OTA staff. About 130 of the agency's 142 full-time employees stayed to the end. "These federal employees, 100 percent of whom just got fired, stayed until the very last second of the life of their agency—just to turn out all of the work that they possibly could for those employers who just fired them," he noted with pride.

In fact, as those last 17 books begin returning from the printer, many OTA employees will return to work gratis, stuffing the reports into envelopes for mailing to Congress and the public.

Anyone not already on the mailing list for these reports can obtain them through the Internet. OTA will make the last 2 years of its offerings available on its World Wide Web site (http://www.ota.gov). By January, all 23 years' worth of OTA reports will be available from the federal government on CD-ROM. *— J. Raloff*

Birds: Lightweights in the genetic sense

Birds are the star athletes of the vertebrate world, pushing their bodies to metabolic extremes in order to defy gravity. Evolution has given them an edge by creating a lightweight skeleton, an aerodynamic coat of feathers, and a highly efficient respiratory system.

Their advantages even extend to the molecular realm. According to a new study, birds cast off excess genetic baggage long ago and in the process developed a much leaner genome.

Biologists have long known that bird cells contain less DNA than those of reptiles, mammals, and amphibians. But they did not know where the genetic differences lay. Austin L. Hughes and Marianne K. Hughes of Pennsylvania State University in University Park explored that question by comparing the sequences of 31 equivalent genes in humans and chickens—two animals for which this information exists.

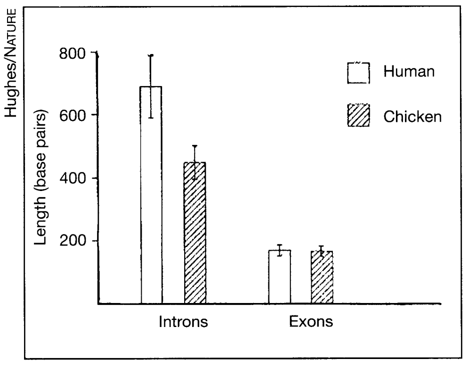
They found that all of the chickens' sequences were shorter because they contain shorter introns, the regions of genes that contain so-called nonsense, or noncoding, DNA. Exons, the regions that contain the blueprints for protein formation, were roughly the same size in chickens and humans, the scientists report in the Oct. 5 NATURE.

A single genetic change could not have shortened all chicken introns, the researchers argue. Instead, evolution gradually trimmed avian DNA, perhaps as an adaptation for flight.

Because the typical cell size of an animal tends to match the length of its genome, the development of shorter introns could account for the relatively small size of bird cells. Smaller cells should make birds more metabolically efficient by speeding up the diffusion of oxygen into the interior portion of cells.

To support their theory, the investigators note that bats tend to have less DNA than other mammals. Furthermore,

Hughes/NATURE



Slim genes: Chickens have smaller introns but similar-size exons.

eagles, pigeons, and other strong flyers have smaller genomes than weak flyers or flightless birds. "It would seem that reduced genome size is an adaptation for flight in vertebrates," conclude the Penn State scientists.

Intron researcher Stephen R. Palumbi of the University of Hawaii in Honolulu warns that the smaller intron size in birds might not have evolved in connection with flight. "There are lots of differences between chickens and humans [aside from flight ability] that may explain that pattern," says Palumbi. Nonetheless, he finds it compelling that bats also have smaller genomes, whereas flightless birds have larger ones.

Evolutionary geneticist Robert C. Fleischer of the National Zoological Park in Washington, D.C., adds that "birds apparently have very efficient enzymes for correcting mistakes in DNA." These enzymes prevent segments of noncoding DNA from multiplying and thereby enlarging the bird genome as they do in other animals. Fleischer had jokingly suggested that the correction system might reduce the weight of birds, although he did not pursue the idea. "I didn't think that anyone would take it seriously," he says. *— R. Monastersky*

SST emissions cut stratospheric ozone

Responding to NASA's proposal to put 500 new high-speed civil transport (HSCT) planes into service by 2015, scientists have been estimating the potential impact of routine supersonic flight on Earth's stratospheric ozone (SN: 10/22/94, p.260). Now they have some hard data.

David W. Fahey, an atmospheric scientist at the National Oceanic and Atmospheric Administration in Boulder, Colo., and his colleagues have measured exhaust emissions from a Concorde supersonic transport (SST) plane during high-altitude flight.

Traversing the exhaust trail of a Concorde 11 times during an Air France flight from Fiji to New Zealand last year, a NASA environmental research plane sampled the SST's exhaust, the researchers report in the Oct. 6 SCIENCE. The Concorde flew at 53,000 feet and at twice the speed of sound.

The scientists measured carbon dioxide, water vapor, reactive nitrogen and hydrogen, and sulfurous particles in the exhaust, finding more small particles than expected. The particles' abundance and size indicates that "sulfuric acid is produced from fuel sulfur more efficiently than expected after emission from the engine," Fahey's team says.

"If a fleet of HSCT aircraft produces particles at a rate comparable to that of the Concorde, increases in particle number and surface area would occur throughout the lower stratosphere in the Northern Hemisphere," they add.

If future planes emit larger than expected numbers of particles, they assert, their exhaust will have a correspondingly greater impact on stratospheric ozone. The researchers also observe that to lessen the exhaust particles' ozone-damaging impact, the sulfur concentrations of jet fuel may need to be "controlled to lower values."

While saying that this study demonstrates "good science and operations," Howard L. Wesoky, an aeronautical engineer at NASA in Washington, D.C., nevertheless adds that its significance is "not yet clear.

"This study is only one of many we're performing to understand how high-speed aircraft emissions react chemically and affect the stratosphere."

Using data from NASA's projections for high-speed flight in 2015, Debra K. Weisenstein, a researcher at Atmospheric and Environmental Research in Cambridge, Mass., found that additional exhaust particles could deplete stratospheric ozone by as much as 1 percent.

"It's safe to say that these results come from a state-of-the-art model," she says. "That's significant." *— R. Lipkin*