Why Are Boys' Birth Rates Falling?

To the mother of a rambunctious boy who courageously dives over furniture and survives a daily bruising while cavorting around the house, the idea that her junior commando might be fragile would probably elicit a hearty laugh.

During fetal development, however, "the male sex is clearly the more fragile one," observes Bruce B. Allan, an obstetrician-gynecologist in Calgary, Alberta. While some 125 males are conceived for every 100 females, he notes, only about 106 boys are born for every 100 girls. In other words, he explains, stillbirths and miscarriages disproportionately cull boys.

In the April 1 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, Devra Lee Davis of the World Resources Institute (WRI) in Washington, D.C., and her colleagues analyze recent surveys by Allan and others who have looked at trends in sex ratios and congenital male reproductive problems in several countries. They find a broad pattern of waning male births and increasing reproductive defects. "There are compelling biological reasons," Davis' team argues, for suspecting that these troubling trends trace to a common problem—disruption of normal male fetal development by environmental agents (SN: 1/22/94, p. 56).

Last year, Allan's team studied sex ratios in Canada from 1930 to 1990. The proportion of males rose for 2 decades—a trend that they suspect reflects the nation's improving health care. The ratio then held steady until 1970, when "we saw a drop in every region," Allan told SCIENCE NEWS. The most significant drop—5.6 boys per 1,000 live births, or twice the drop in the rest of Canada—occurred in the Atlantic provinces.

Because the sex ratio at birth "is a parameter that really shouldn't change" in a healthy, well-cared-for population, Allan says, his team decided to analyze U.S. births over the same period. "And though more subtle, the male sex ratio was dropping there, too," by about 1 boy per 1,000 births.

Over the past 2 years, Dutch and Danish researchers have reported similar drops in their countries. Just last month, data in APMIS, a journal published in Copenhagen, reported declining male births in Sweden, Germany, Norway, and Finland.

Evidence of a decline over such a broad geographic area, says WRI's Michelle B. Gottlieb, a coauthor of the new study, "suggests that avoidable, [likely] environmental, factors may be playing a role." Though certain diseases, older parents, and fertility-stimulating drugs have all been linked to an increasing proportion of female births, Gottlieb's team found that these factors could explain only a small part of the observed trend.

Meanwhile, she says, several recent studies point to the possible importance of ubiquitous hormonelike pollutants. For instance, a 1996 study reported the sex of children born to couples who had been exposed to large amounts of dioxin during a July 1976 industrial accident near Seveso, Italy. In the first 8 years after the accident, 12 daughters—and no sons—were born to the nine couples who had more than 100 parts per trillion (ppt) of dioxin in blood samples taken at the time of the accident.

Among the four couples whose dioxin concentrations were below 100 ppt, the male-female ratio approached normal, says Larry L. Needham, who with his colleagues at the Centers for Disease Control and Prevention in Atlanta analyzed the blood samples. He's now examining another 1,000 samples from other Seveso victims.

The new report "focuses attention on a trend that people might not have noticed by viewing individual studies," says Shanna Swan, a reproductive epidemiologist with the California Department of Health Services in Berkeley. "The consistency of the data is quite compelling—and lends biological plausibility that [the trend] might be due to environmental chemicals," she adds.

Indeed, the WRI analysis presents "a coherent, plausible argument for the [birth] ratio being a sentinel indicator—a flag" of a potential problem, says Boston University epidemiologist Richard Clapp. By scouting out "hot spots" where sex ratios are especially skewed, he says, "we might now get closer to finding the causative agents." —*J. Raloff*

Bony growths found in heart valves

A hardened heart valve is like a rusty carburetor on a car: It can stall the machinery.

Working properly, heart valves maintain a one-way flow of blood, preventing backups in one heart chamber or leakage into another. If a valve becomes inflexible and jams, too much blood can flood a chamber and overwork it. If not corrected, faulty valves cause heart murmurs and can lead to heart failure.

Calcium buildups precipitate most heart valve surgery, but researchers now report that many bad valves also have bone growing inside them.

The scientists examined 228 valves removed from 206 patients, whose average age was 68, in heart operations performed between 1994 and 1997. Nearly all of the valves showed some calcification. Surprisingly, 30 of the valves had bony growths, says cardiologist Emile R. Mohler III of the University of Pennsylvania Medical Center in Philadelphia. He presented his team's findings in Atlanta this week at a meeting of the American College of Cardiology.

Evidence of living bone presents a puzzle that goes beyond simple calcium accumulation. "It's startling that cellular organization is involved," Mohler says. "It's bizarre."

A telltale protein called osteopontin appears in these bony valves and sems to play a pivotal role in their ossification. Osteopontin is called a matrix protein because it acts as a framework for bone, which the body builds from calcium.

Osteopontin just doesn't belong in heart valves.

Mohler suggests that genes encoding osteopontin reside innocuously in valve tissues until an injury or other stimulus triggers them. Or, he says, bone tissue may form when stresses in a valve attract roving immune cells called macrophages, which would somehow abet osteopontin production.

"The whole interaction between various cell types and tissues is an area where knowledge is just starting to come on line," says cardiac surgeon John E. Mayer of Harvard Medical School in Boston.

Repetitive trauma has been shown to cause calcium deposits in various parts of the body, he notes. Since heart valves never rest, they make good candidates for such buildup and perhaps ossification.

Doctors remove defective valves from more than 70,000 people a year in the United States. Some are replaced with valves fashioned from pig tissue. These new flaps work, but they can calcify in 8 to 10 years, says Patrice Desvigne-Nickens of the National Heart, Lung, and Blood Institute in Bethesda, Md. Mechanical valves last longer but require the patient to take blood thinners, she adds.

Understanding the cellular machinery in valves and the proteins that drive it may someday enable doctors to unravel faulty valves' declining function and present patients with options other than surgery, Mohler says. —*N. Seppa*