

What Goes Around Comes Around: *A look at the outcome of careless human activity*

As you read these two articles please keep in mind the following questions. When you are finished reading be prepared to share what you think with the class.

1. What human activity is causing the problem each article?
2. Do you think it was possible to anticipate these problems?
3. Do you think that problems in other species may be indicators of problems to come for humans? How So?

(03/17/2002) Scientists suspect pollution by an "exquisitely potent" synthetic form of estrogen used in birth control pills is responsible for British government findings that half of the male fish in the country's lowland rivers have eggs developing in their testes or other forms of intersex development. Half of all the male fish in Britain's lowland rivers are changing sex as a result of pollution, alarming new official research suggests. The findings raise serious questions as to whether the pollution is getting into drinking water and affecting human fertility. The research - to be published by Britain's Environment Agency - shows that male fish are developing female characteristics in rivers all over the country. In some stretches all the male fish have been feminised.

Scientists conducting the research blame a particularly powerful form of oestrogen (estrogen) in urine from birth control pills, which is flushed through sewage treatment plants into the rivers. Some fear that the "exquisitely potent" chemical may be contaminating part of the one-third of all of the country's drinking water that is taken from rivers.

The water industry and the agency deny that the situation could damage health. But the Environment Agency said that it is taking the pollution "very seriously" and will unveil an action programme later this month. and environmentalists say the fertility of some men could be affected by years of drinking the water. Sperm counts have been falling dramatically in Britain over the past half-century. Peter Ainsworth, the shadow environment secretary, said: "Danger to human fertility cannot be ruled out" and called for an urgent programme of research on the threat.

The research, financed by the Department of Environment Food and Rural Affairs and the official Natural Environment Research Council, examined roach fish from 10 rivers over the past five years. They found feminised "intersex" males in all of them - the rivers Lea in Hertfordshire (from which London takes much of its drinking water), Blackwater in Essex, Arun in West Sussex, Avon in Bristol, Rea in Shropshire, Wreake in Leicestershire, Nene in the East Midlands, Ouse in North Yorkshire and Aire and Calder in West Yorkshire.

The study found that, on average, just under 50 per cent of the male fish had developed eggs in their testes, and/or female reproductive ducts - a finding they believe is likely to be typical of roach and other species of fish all over the country. In stretches of the Aire and Nene all the male fish were affected in this way, and even in relatively unpolluted waters 7 to 8 per cent were affected.

The fish did not change back after being put into clean water, suggesting that the changes were permanent. About one tenth of the male fish were sterile, and about another quarter had damaged sperm.

The research suggests that the main culprit is ethanol oestradiol (estradiol), a synthetic oestrogen used in the contraceptive pill which scientists say can feminise fish at levels of as low as one part per billion. Conventional sewage treatment is ineffective at removing it from water.

Professor Charles Tyler of Exeter University, one of the leaders of the research, says ethanol estradiol is "so exquisitely potent that some of the very concentrations where we are seeing effects on fish are below the detection limit that is presently in place for testing our drinking water. So we cannot be sure that some of

these compounds, albeit at very low concentrations, aren't getting into our drinking water".

Dr. Susan Jobling of Brunel University, who led the research, said the research on fish should be taken as a warning to humans. Said Jobling, "The issue is not just about fish. Everything that we eat, put on our skin, throw down the drain, ends up in the sewage treatment works and ultimately in the river. So one could argue that we are actually living in a sea of oestrogen, a chemical cocktail, and therefore I think there are very real reasons to be worried about whether male reproductive health could also be affected in the same way that fish reproductive health is affected."

"Unlike in fish, it is going to take 20 years to see if my children have been affected by developmental exposure to this same cocktail of chemicals," Jobling said. (Sources)

(01/29/2002) Study finds that men who eat Great Lakes fish contaminated with toxic, hormone-disrupting chemicals such as PCBs father a disproportionately high number of boys. Men who eat fish from the Great Lakes, which are laced with such toxic industrial chemicals as PCBs, conceive a disproportionately high number of sons, according to new research.

The strange effect that PCBs seem to have on sex ratios is poorly understood, but is too significant to pass off as mere coincidence, said Wilfried Karmaus, a professor of epidemiology at the University of Michigan. He suggested the effect might be due to a disruption of hormone levels in the male reproductive system, which has been documented in other, more severe cases of PCB exposure.

Karmaus followed nearly 400 families who regularly ate various fish - walleye, carp, salmon, trout, among others - they caught in Lake Michigan. Of the 208 children born to the men with the highest PCB content in their blood, 57% of them were boys. This figure is statistically far higher than the worldwide average sex ratio in which about 52% of newborns are male.

Strangely, the mother's exposure to PCBs had no significant effect on sex ratios, despite the close physiological contact between mother and fetus. Karmaus said the phenomenon of skewed birth rates is likely mirrored in fishermen on each of the Great Lakes.

"Being a boy is not a disease," said Karmaus, the lead researcher on the report in the Journal of Occupational and Environmental Medicine, "but we can show that there are some health effects on human reproduction from PCBs."

PCBs are among a number of environmental contaminants that have plagued the Great Lakes for years. They can come from any number of sources, including hydraulic fluids and oils, electrical capacitors and transformers, and as a by-product of paper mills that dot the shoreline.

PCBs, or polychlorinated biphenyls, were in wide industrial use from the 1930s to the 1970s, figuring as ingredients in paints, caulking and electrical coolants and insulators. Concern about their toxic effects led to a continent-wide ban on importing and producing PCBs in 1977, but the persistent chemicals decompose at such a slow rate that they are still found at dangerous levels in Great Lakes fish.

The Ontario Ministry of the Environment has issued specific warnings about PCBs in fish and their harmful effects on expectant mothers, but their guide to edible sport fish does not mention effects on male reproductive health.

The explanation for the skewed birth rate around Lake Michigan is probably hormonal, Karmaus said, but PCBs may also have some as-yet-unknown toxicological effect on the male fetus, which is known to be more fragile than the female.