The WASHINGTON POST reported September 30 that frogs with severe birth defects have been discovered during the past two summers in 54 of Minnesota's 87 counties, across Wisconsin, and up into the St. Lawrence River Valley in Quebec, Canada.[1]

According to the POST, herpetologists (scientists who study amphibians and reptiles) have reported finding frogs with missing legs, extra legs, misshapen legs, paralyzed legs that stuck out from the body at odd places, legs that were webbed together with extra skin, legs that were fused to the body, and legs that split into two half-way down. They have also found frogs with missing eyes. One one-eyed frog had a second eye growing inside its throat.

Robert McKinnell, a geneticist and cancer researcher at University of Minnesota (St. Paul, Minn.), said he initially thought the reports of deformed frogs didn't amount to much. Frogs have a small number of birth defects naturally. Then McKinnell began visiting various sites in Minnesota and finding a large proportion of deformed frogs (96% at one site). Now he says, 'The whole state appears to be affected. We should be alarmed.'

Frogs are amphibians. They spend their lives both in the water and on dry land. Beginning life as eggs floating on the surface of still waters, they develop into swimming tadpoles, eventually changing completely, becoming frogs. These major changes in form occur under the control of hormones, which are chemical messengers that travel throughout the organism, turning on and off bodily processes.

Since August, 1995, when the first deformed frogs were found in south-central Minnesota, researchers have been searching for the cause, without success. So far, they say, they believe inherited genetic mutations are not involved. This would mean the deformities are being caused by something that affects the frogs during early life, when they are eggs or tadpoles. Judy Helgen, the research scientist who is leading the investigation on behalf of the Minnesota Pollution Control Agency says she thinks the cause will eventually be discovered to be chemicals of some kind, though it could take several years to pin it down.

Little research has been done to study the effects of environmental chemicals on amphibians. It seems that most researchers have been focused on confirming or refuting the reported worldwide decline in populations of frogs, toads and salamanders. (See REHW #246, #380.) Indeed, some of the recently-reported declines are large, mysterious and compelling. For example, a study published in April compared amphibian populations in 1915 vs. 1992 in Yosemite Park in California. The study found that seven kinds of amphibians are declining in numbers, and three have disappeared entirely from Yosemite.[2] Yosemite isn't truly pristine because of air pollution from distant cities, but it is about as clean an environment as you can find in the lower 48 states. Dr. Ronald Heyer, a researcher with the Smithsonian Institution (and chair of the Declining Amphibian Populations Task Force [DAPTF] of the World Conservation Union's Species Survival Commission) says, 'It's kind of chilling in its effect. Here we have what we consider to be a relatively protected place, and amphibian declines are occurring even there.'[3]

Amphibians are particularly sensitive to chemical pollution because they live both in water and on land. Furthermore, they breathe through their skin. Some researchers suspect that toxic heavy metals and pesticides building up in aquatic food chains, plus serious air pollution, may be what's killing some frogs, toads, and salamanders.

Many researchers now believe that increased ultraviolet radiation may be affecting frogs' eggs, which float on the surface of the water, absorbing sunlight.

Despite scientists' intense focus on population decline and extinction, recent studies have begun to try to find the causes of birth defects in frogs in Minnesota and Wisconsin. At the Great Lakes Declining Amphibians Conference in Milwaukee March 30, Robin E. Jung from the University of Wisconsin at Madison described new studies indicating that leopard frogs collected at a PCB-contaminated site on the Fox River in Wisconsin had more spinal deformities than frogs collected at a cleaner Green Bay site.[4]

A few previous studies had linked frog deformities to pesticides.[5,6,7] Still, to date, remarkably little testing has been done to see if environmental chemicals cause birth defects in frogs.

On the other hand, a recent large study has linked birth defects in humans to pesticide use in Minnesota.[8]

Researchers from the University of Minnesota and the U.S. Environmental Protection Agency (EPA) linked the Minnesota birth registry for the years 1989-1992 with information about pesticide use across the state.

Two pictures emerged: (1) the birth defect rate for all birth defects was significantly increased in children born to private pesticide applicators, compared to the general population; and (2) births in the general population of western Minnesota (the area of highest use of pesticides) showed a significant increase in birth defects, compared to the rest of the state. This second effect was most pronounced among children conceived during the spring.

Researchers from the University of Minnesota and the U.S. Environmental Protection Agency (EPA) examined 210,723 birth records in the state of Minnesota covering the four-year period 1989-1992.

They first focused on 4935 children born to state-licensed private pesticide applicators in Minnesota (of which there are 34,772). They found statistically significant elevations in the occurrence of all birth defects; and urogenital defects. These populations of frogs, toads and salamanders. (See REHW #246, #380.) Indeed, some of the recently-reported declines are large, mysterious and compelling. For example, a study published in April compared amphibian populations in 1915 vs. 1992 in Yosemite Park in California. The study found that seven kinds of amphibians are declining in numbers, and three have disappeared entirely from Yosemite.[2] Yosemite isn't truly pristine because of air pollution from distant cities, but it is about as clean an environment as you can find in the lower 48 states. Dr. Ronald Heyer, a researcher with the Smithsonian Institution (and chair of the Declining Amphibian Populations Task Force [DAPTF] of the World Conservation Union's Species Survival Commission) says, 'It's kind of chilling in its effect. Here we have what we consider to be a relatively protected place, and amphibian declines are occurring even there.'[3]

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In Minnesota in 1989-1992, the sex ratio was 105 males to 100 females for normal births and 138 males to 100 females for births with defects. The researchers say they believe something in the pesticides used in Minnesota is suppressing the births of female children or favoring the births of males.

Interestingly, a recent study examined the sex ratio among the first 74 children born to parents exposed to dioxin during an industrial accident at Seveso, Italy.[9] Among highly dioxin-exposed parents, female children outnumbered males (26 males vs. 48 females, a ratio of 54 males for every 100 females). This skewed sex ratio lasted for 8 years after the Seveso accident, then returned to normal.

Children may be the victims of pesticides and dioxin, yet they still offer hope. The first deformed frogs were discovered in Minnesota in August 1995 by middle school children --10 year olds --on a field trip to a farm.[1] After they noticed a one-legged frog, they started collecting others. In a morning they collected 22 frogs, 11 of them with major birth defects. "I think the kids got kind of scared," says their teacher, Cindy Reinitz. "They immediately started asking me what the cancer rate was in the area." Now that's an impressive question from a group of 10 year olds. When all our health officials and corporate CEOs are as alert, insightful and concerned as those children, we'll no longer have to rely on frogs to give us warning.

--Peter Montague
(National Writers Union, UAW Local 1981/AFL-CIO)

[6] G.S. Schuytema and others, "Toxicity of Guthion and Guthion 2S to XENOPUS LAEVIS Embryos.," ARCHIVES OF ENVIRONMENTAL CONTAMINATION AND TOXICOLOGY, Vol. 27 No. 2 (August 1994), pgs. 250-255. In this study, Schuytema says he believes it is the "inert" ingredients in the pesticides that cause the toxicity of Guthion (an organophosphate) to frogs. So-called "inerts" are secret ingredients in pesticides; many "inerts" are not inert at all, but are chemically active and toxic. By federal law the public (including scientific researchers) are prohibited from knowing what "inert ingredients" have been added to a pesticide.

Descriptor terms: frogs; amphibians; wildlife; birth defects; teratogens; pesticides; pcbs; species loss; yosemite; california; air pollution; ultraviolet radiation; fox river; wi; mn; green bay; children; dioxin; sex ratio; seveso; italy; extinction;