

Rachel's Environment & Health News

#457 - Dioxin Inquisition

August 30, 1995

People calling themselves "conservatives" in Congress are preparing to flay U.S. Environmental Protection Agency (EPA) scientists for their reassessment of dioxin --the agency's 4-year effort to determine the true hazards of dioxin. Dioxin is a highly toxic byproduct produced in the manufacture of many pesticides, and by the routine operation of all incinerators, metal smelters, and chlorine-using paper mills. In 1986, EPA concluded that dioxin was one of the two or three most powerful poisons ever studied, and accordingly, set strict limits on certain releases into water. As the agency moved to enforce those limits in the late 1980s, industrial dioxin-producers developed a strategy for reversing EPA's stance: They would force the agency to undertake a scientific reassessment of dioxin, a reassessment they evidently thought they could control.

The paper industry took the lead in pressuring EPA to formally reassess dioxin. (See REHW #269, #270 and #275.) On January 23, 1991, four chief executive officers of paper companies visited William Reilly, who was then the head of EPA. The four executives memorialized their meeting by sending Reilly a letter dated January 25th --a letter that (thanks to Greenpeace) found its way into the record of a public hearing on the dioxin reassessment which EPA held in Washington, D.C. November 15, 1991. In their letter, the four executives (John A. Georges, International Paper; T. Marshall Hahn, Jr., Georgia-Pacific Corp.; Furman C. Moseley, Simpson Paper; and Andrew C. Sigler, Champion International) thanked Reilly for his receptiveness to their ideas during the meeting January 23: "We were also encouraged by what we perceived as your willingness to move expeditiously to re-examine the potency of dioxin and chloroform in light of the important new information that has been submitted with respect to those chemicals," the paper company executives said. They rebuked EPA for "failure to act on the emerging health science." They told Reilly there is now a "prevailing view that low-level dioxin exposures do not pose a serious health threat." "Despite this new reality," they said, "EPA has taken no tangible or timely steps to revisit its health criteria for dioxin, and has even failed to temper the Agency's zeal in acting on the worst risk estimates...."

As a direct result, EPA's "scientific reassessment" of dioxin was born. By April, 1991, Reilly had geared up his agency for a major effort to reassess the toxicity of dioxin, just as the paper industry had requested. In August, just 4 months into the multi-year study, Reilly told the NEW YORK TIMES how he expected the dioxin reassessment to turn out: "I don't want to prejudge the issue, but we are seeing new information on dioxin that suggests a lower risk assessment for dioxin should be applied," Reilly told the TIMES (August 15, 1991, pg. 1).

However, the scientific reassessment did not turn out as Reilly and the paper industry supposed it would. EPA scientists evidently took their mandate seriously. They designed a reassessment process that involved original laboratory research, many meetings with non-government scientists, at least 2 public hearings, and many drafts of the 9-volume reassessment document, which was peer-reviewed prior to release. Eight of the nine volumes were written by non-governmental scientists. EPA had never before involved such a large number of non-agency scientists in its work. It managed to solicit and include the viewpoints of industry, academia, government, and the general public.

As a result, EPA scientists concluded a year ago that dioxin probably causes cancer in wildlife and humans, and that it harms the immune system and the reproductive systems in fish, birds, and mammals (including humans) at doses that are miniscule. The lead scientist on the EPA reassessment team, Dr. Linda Birnbaum,

said she and her colleagues now consider dioxin an "environmental hormone" capable of disrupting a large number of bodily processes in fish, birds, and mammals, including humans. Dioxin, EPA said, is especially powerful in its effects on the unborn and the newly-born. (See REHW #290, #390, #391, and #414.) This was hardly the outcome the paper industry had expected.

The final draft of the 9-volume reassessment document went to EPA's science advisory board (SAB) this year; at an SAB meeting May 16, 1995, parts of the dioxin reassessment were criticized. Specifically, the SAB asked EPA to provide better support for some of the conclusions in Volume 9 (conclusions which we summarized in REHW #390 and #391), but they did not tell EPA to do any additional scientific work.

Using the SAB's comments on the reassessment (which have not yet been made public) as a political springboard, a group of so-called "conservatives" of both parties in Congress are planning to investigate "whether sound science is being distorted for preconceived policy ends, and the potential economic impact of future mandates based on this reassessment." [1]

Congress has scheduled a public hearing Sept. 13 before the House Subcommittee on Energy and the Environment of the Committee on Science. It is widely understood in Washington that this hearing is going to be a "witch hunt" aimed at punishing EPA for reaching conclusions that the paper industry and other industrial poisoners don't like.

Everyone who has followed the story of tobacco during the last 20 years knows there are a handful of scientists who still claim there is no compelling evidence that tobacco causes lung cancer in humans. These "tobacco scientists" have counterparts in the dioxin world, and this little group of dioxin denial specialists will be showcased at the hearing September 13. They are expected to say that EPA and its 100-or- so independent outside scientific advisers have made a mountain out of a mole hill. Congress may use their testimony as an excuse to further slash EPA's research budget, thus exorcising the source of much recent bad news about dioxin.

Meanwhile, the scientific evidence linking dioxin to serious reproductive disorders in mammals has continued to accumulate. Just this month, Dr. Earl Gray (a respected EPA researcher) published the third in a series of studies of the effects of a single low dose of dioxin on rats and hamsters. This series began with 3 studies published in 1992 by Dr. Richard E. Peterson at the University of Wisconsin.[2]

In the Peterson studies, young male rats whose mothers were given as little as 0.064 micrograms of dioxin per kilogram of body weight showed consistently reduced levels of male hormones, plus a variety of sex-related changes, including:

- ** smaller accessory sex organs, including smaller testicles;

- ** slower sexual maturation;

- ** distinctly feminine-style regulation of one hormone related to testosterone production;

- ** greater willingness to assume a receptive-female posture when approached by a sexually stimulated male.

Other effects revealed by the Wisconsin studies included:

- ** Even the lowest dose tested (0.064 micrograms of dioxin per kilogram of the mother's body weight), yielded consistent reductions in a male offspring's daily sperm production.

- ** The developing male reproductive system is more sensitive to the effects of this hormone-like toxicant [dioxin] than any other organ or organ-system studied.

- ** The unborn or newborn is about 100 times more sensitive to dioxin than the sexually mature animal.

What do these studies mean for humans?

The Wisconsin researchers speculated, "Thus the findings from this

study raise the possibility that TCDD could potentially affect sexually dimorphic behavior in man if exposure were to occur during fetal development." "Sexually dimorphic behavior" refers to the bodily and behavioral differences between men and women. Is it possible that homosexual behavior in some individuals may be conditioned by exposure to chemicals before birth? It seems to be so in laboratory animals, in wildlife, and in some humans whose pregnant mothers were exposed to diethylstilbestrol (DES), a powerful hormone.[3]

Commenting in 1992 on the Peterson rat studies (which she called "highly significant"), Linda Birnbaum of EPA said, "The real question is how general these effects are." And if these effects occur in another species? "I would get very concerned [about the potential human-health implications]," Birnbaum told Janet Raloff, a reporter for SCIENCE NEWS.[4]

In March, 1995, Birnbaum herself (with Earl Gray, William Kelce and others) published studies confirming that many of Peterson's findings could be reproduced in another strain of rat, and in another species entirely, the Syrian hamster. The hamster is known for being insensitive to dioxin's effects, yet single low-dose exposures of pregnant hamsters to dioxin produced nearly a 60% reduction in sperm count in male offspring, plus other important changes, such as a 23% reduction in the size of the adrenal gland.[5]

This month, Earl Gray published a third study showing that a single low dose of dioxin to pregnant rats could produce hermaphroditic FEMALE offspring. Hermaphroditic means having male and female sex organs simultaneously.[6] Other effects included 30% reduction in the weight of the ovaries; shortened reproductive life span; and increased incidence of cystic hyperplasia of the endometrium (formation of multiple cysts in the tissues lining the uterus).

There can no longer be any doubt that dioxin in very low exposures during early development in mammals can dramatically alter sexual development and behavior. The public health implications are enormous.

This Congress seems in a mood to crucify EPA scientists for reaching politically incorrect conclusions about dioxin. In an earlier time (1632), a scientist like Galileo, threatened by powerful religious zealots of his day, saved himself by recanting. Will EPA scientists be forced to do the same?

--Peter Montague

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[1] Letter dated August 10, 1995, from Dana Rohrabacher to EPA chief Carol Browner inviting her to testify September 13, 1995 before the House Energy and Environment Subcommittee of the Committee on Science.

[2] Thomas A. Mably and others, "IN UTERO and Lactational Exposure of Male Rats to 2,3,7,8-Tetrachlorodibenzo-p-dioxin. 1. Effects on Androgenic Status." TOXICOLOGY AND APPLIED PHARMACOLOGY Vol. 114 (May, 1992), pgs. 97-107. And: Thomas A. Mably and others, "IN UTERO and Lactational Exposure of Male Rats to 2,3,7,8-Tetrachlorodibenzo-p-dioxin. 2. Effects on Sexual Behavior and the Regulation of Luteinizing Hormone Secretion in Adulthood." TOXICOLOGY AND APPLIED PHARMACOLOGY Vol. 114 (May, 1992), pgs. 108-117. And: Thomas A. Mably and others, "IN UTERO and Lactational Exposure of Male Rats to 2,3,7,8-Tetrachlorodibenzo-p-dioxin. 3. Effects on Spermatogenesis and Reproductive Capability." TOXICOLOGY AND APPLIED PHARMACOLOGY Vol. 114 (May, 1992), pgs. 118-126.

[3] Relevant studies are reviewed in Glen A. Fox, "Epidemiological and Pathobiological Evidence of Contaminant-Induced Alterations in Sexual Development in Free-Living Wildlife," in Theo Colborn and Coralie Clement, editors, CHEMICALLY-INDUCED ALTERATIONS IN SEXUAL AND FUNCTIONAL DEVELOPMENT: THE WILDLIFE/HUMAN CONNECTION [Advances in Modern Environmental Toxicology Vol. XXI] (Princeton, N.J.: Princeton Scientific Publishing Co., 1992), pgs. 147-158. The human evidence from DES exposures is described in the same volume by Melissa Hines, "Surrounded by Estrogens? Considerations for Neurobehavioral Development in Human Beings," pgs. 261-281.

[4] J. Raloff, "Perinatal dioxin feminizes male rats," SCIENCE NEWS Vol. 141 (May 30, 1992), pg. 359.

[5] L.E. Gray, Jr., and others, "Exposure to TCDD during Development Permanently Alters Reproductive Function in Male Long Evans Rats and Hamsters: Reduced Ejaculated and Epididymal Sperm Numbers and Sex Accessory Gland Weights in Offspring with Normal Androgenic Status," TOXICOLOGY AND APPLIED PHARMACOLOGY Vol. 131 (1995), pgs. 108-118.

[6] Leon Earl Gray, Jr., and Joseph S. Ostby, "IN UTERO 2,3,7,8-Tetrachlorodibenzo-P-dioxin (TCDD) Alters Reproductive Morphology and Function in Female Rat Offspring," TOXICOLOGY AND APPLIED PHARMACOLOGY Vol. 133 (1995), pgs. 285-294.

Descriptor terms: dioxin; toxicity; endocrine system; endocrine disruptors; congress; public hearings; conservatives; conservatism; hermaphroditism; homosexuality; sperm count; growth; rats; hamsters; humans; morbidity; epa; linda birnbaum; earl gray; studies; janet raloff; dioxin reassessment; pulp and paper industry; corruption; science; epa science advisory board; environmental hormones; fish; birds; wildlife; mammals; adrenal gland; testicles; feminization; masculinization; tobacco; william kelce; endometrium; galileo;