Special 16-page Report

Fluorides and the Environment

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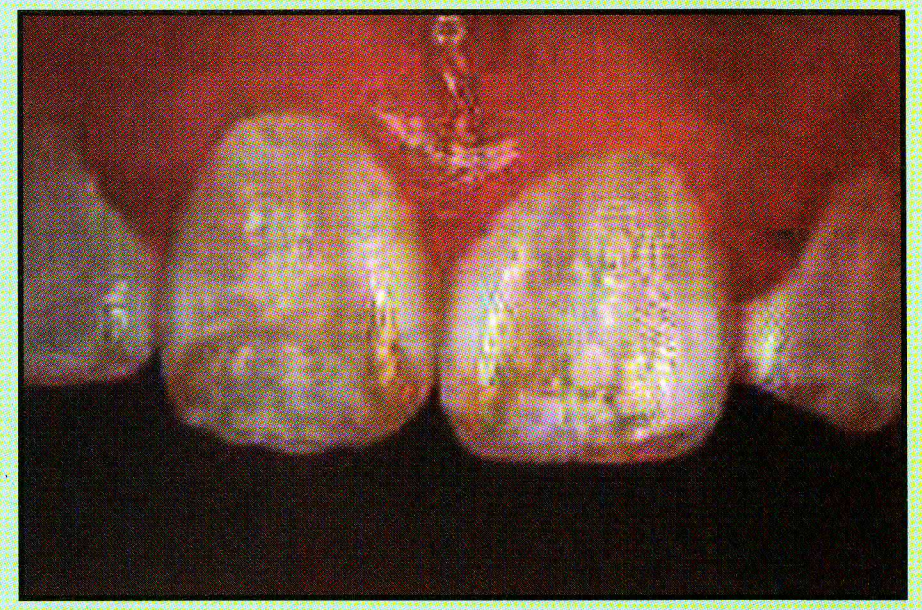

An example of dental fluorosis. Dental fluorosis is found in persons who were exposed to fluoride during the formation of their permanent teeth. It is the first visible sign of fluorosis.

Why Fluoride Is an Environmental Issue

by Gar Smith

While fluoride compounds occur naturally in some water supplies, the past 50 years have seen a dramatic – and troubling – increase in the volume of man-made industrial fluoride compounds expelled into our water and air.

Pouring fluorides into water supplies has generated controversy and opposition for five contentious decades. Meanwhile, little attention has been paid to the fluoride pollution that pours into the atmosphere from thousands of industrial plants around the world.

Fluoride pollution is not a new problem. As the two reports cited below show, concerns about the dangers of fluoride contamination were well known 25 years ago.

Fluoride Pollution: In Our Water, Our Air and Our Food

"Fluorides are pollutants with considerable potential for producing ecological damage," Edward Groth III warned in an article in the April/May 1975 issue of *Environment*. By the end of the 1960s, the EPA estimated that 155,000 tons of fluoride (calculated as hydrogen fluoride) was pouring into the atmosphere each year from aluminum smelters, phosphate processing, coal combustion and the manufacturing of steel, bricks and glass products.

Several types of coniferous forests are vulnerable to fluoride damage at one part per billion (ppb) or less. Because fluoride does not break-down, it slowly accumulates in the environment. As early as 1971, the National Research Council warned that fluoride pollution from US industry (in concentrations as low as 1 ppb) had caused serious damage to plants and posed a threat to livestock as far as 20 miles downwind of the emission points. Some grasses consumed by livestock have been found to contain 200,000 times more fluoride than in the ambient air.

A 1971 National Park Service study of the area downwind of an Anaconda aluminum company smelter and a phosphate plant found excessive elevations of fluoride in pines, firs, grasses, shrubs, herbs and hay. Honey bees had the highest fluoride levels among insects. Wildlife, from birds and ground squirrels to larger mammal predators, had fluoride levels that reached as high as 13,333 parts per million (ppm).

{CONTINUED ON NEXT PAGE}

To date..., the USDA has manifested no official concern about the influence of fluoric air pollution on any part of the nation's produce."
– Jerard and Patrick, 1973

Foraging on grasses containing 30 to 40 ppm of fluoride can be toxic to cattle. Mussels, oysters, crabs, shrimp and prawns have been killed by aquatic fluoride pollution.

Groth noted that some plants can synthesize organic fluoride compounds like fluoroacetates which *Fluoride Quarterly Reports* identified as "among the most poisonous substances known." Fluoro-organic residues have turned up in soybeans, lettuce, tea and oatmeal.

Airborne pollution dusts food crops with sodium fluoroacetate (which is sold commercially as Compound 1080, a deadly rodenticide). Groth observed that "a general buildup of fluoro-organic compounds in natural food webs" risks severe ecological damage.

Groth also noted that "fluoride may interact synergistically with other environmental pollutants to produce greater effects than either pollutant could cause were it acting alone." This synergistic "boost" has been demonstrated between fluoride and copper and between airborne hydrogen fluoride and sulfur dioxide.

Fluoridating the water for 100 million people requires dumping approximately 20,000 tons of fluoride into municipal reservoirs each year. About half of the ingested fluoride winds up stored in human teeth and bones. The rest returns to the environment via the household toilet.

A 1964 scientific study of fluoride levels in sewage in 56 California cities "demonstrated that domestic sewage already contained fluoride over and above that naturally present in water or added for dental health," Groth reported.

The study discovered that even residents in cities without fluoridated water were consuming so much excess fluoride in their foods and beverages that they were flushing "significant fluoride into receiving streams in their sewage."

The "Unpublicized Pollutant"

In a 1973 report in the *International Journal of Environmental Studies*, researchers Elise Jerard and J.B. Patrick identified fluoride as "a highly unpublicized pollutant" that the President's Science Advisory Committee once classified as a "highest priority" contaminant.

"During the past three decades, fluoride discharges from fossil fuel combustion – and more than 50 types of major industries – have steadily increased the burden of airborne contamination," Jerard and Patrick wrote. "Invisible but potent, these emissions in both gaseous and particulate form, with their repertoire of ecological effects, pollute rain, soil, plant life and animals, surface waters [and]... both directly and through interactions of this cycle – man."

Jerard and Patrick reported that "airborne fluoride accumulates in plants and can concentrate in the leafy portions by a factor of 2- to 260-fold without any visible sign of the contamination."

Jerard and Patrick reported that in some regions of Florida, "25,000 acres of citrus trees have been destroyed" within 50 miles of the phosphate processing plants and apparently "normal" specimens of orange juice were found to contain 3-12 ppm of fluoride.

In 1966, Professor of Atmospheric Sanitation Morris Katz noted that, while most air pollutants are measured in parts per million, atmospheric fluoride must be monitored in parts per *billion*. Katz warned that prolonged exposure to airborne fluoride concentrations of less than 1 ppb "may create a hazard [since].... fluorides are more than 100 times more toxic than sulfur dioxide."

In 1969, a massive fish kill that turned Placentia Bay, Newfoundland into "a biological desert" was traced to fluoride effluent from a plant that produced elemental phosphorus for metal finishing and consumer goods. Some 22,800 pounds of fluoride effluent poured into the bay each day, primarily in the form of hydrofluosilicic acid – the same substance used to fluoridate city water supplies.

According to US *Department of Agriculture Handbook No. 380*: "Airborne fluorides have caused more worldwide damage to domestic animals than any other air pollutant." The handbook's list of fluorosis symptoms included: "dental mottling, respiratory distress, stiffness in knees or elbows or both" and concluded with the observation that "Man is much more sensitive than domestic animals to F [fluoride] intoxication."

In a 1970 report on "The Effects of Fluorides on Man," Harold C. Hodge (*See* Earth Island Journal, *Winter, Spring '98*) listed some of the symptoms of fluoride poisoning found in industrial workers: osteosclerosis, ossifications of ligamentous attachments, sinus trouble, perforation of the nasal septum, chest pains, coughs, thyroid disorders, anemia, dizziness, weakness and nausea.

Fluoride in the Food Chain

Twenty-five years ago, Jerard and Patrick issued an alarm about the growing presence of fluorides in the food chain. The researchers listed numerous examples of severe fluoride pollution on foods ranging from spinach, lettuce and tubers to the milk and meat of cows. In addition to contamination from atmospheric fluorides, Jerard and Patrick discovered that farm produce also picks up fluoride pollution from phosphate fertilizers and fluoride-bearing pesticides applied to apples, pears, celery and raspberries.

Coal-burning electric powerplants and the petroleum industry are major sources of urban fluoride pollution. Jerard and Patrick also noted a "considerable fluoride content, up to 16% or more, in a number of important drugs, including tranquilizers, corticosteroids, some preparations used in cancer therapy and anesthetics."

"Fluoride-emitting factories, once scattered with wide exclusion zones, have proliferated and become more closely concentrated," Jerard and Patrick observed in 1973. "Foods grown in fluoride-polluted regions are distributed over great distances... Foods and beverages processed with fluoridated water are mass-distributed."

Each liter of fluoridated water, at 1 ppm concentration, contains a one milligram dose of fluoride — the so-called "recommended" daily amount. Water, however, is only one source of ingested fluoride. In 1991, the US Public Health Service estimated that the total daily intake for a 110-pound adult from all sources in an "optimally" fluoridated city, ranged as high as 6.6 milligrams. In 1997, the EPA estimated that Americans were ingesting nearly five times more fluoride than in 1971 — from food and drinks alone.

Children are more at risk of over-exposure than adults. A 1991 study by the *Journal of Clinical Pediatric Dentistry* found that every sample of bottled fruit beverages tested contained fluoride. One sample of Gerber's grape juice contained 6.8 ppm – 70% higher that the EPA's Maximum Contaminant Level of 4 ppm for fluoride in drinking water and 240% higher than the EPA's 2 ppm standard set to protect against dental fluorosis.

Currently there is no federal program to detect or label the fluoride content in US foods or drinks. We hope that this special report will help to encourage a fundamental review of the health and ecological impacts of fluorides in the environment.

"To date..., fluoride has received relatively little attention as a contaminant of the ecosystem."
– Edward Groth III, 1975

A Clear and Present Danger

by Bob Woffinden
The London Guardian

Since childhood we have been told that fluoride is good for our teeth. It is added to the water supply of many regions for just that reason. Our children brush regularly with great quantities of it. But fluoride toxicity has been linked to bone disease, infant mortality and brain damage. And the line between safety and danger, purity and poison is a thin one.

Fluoride first entered the public consciousness as part of a post-war new dawn, when science would unerringly lead the way to a better life for all. It came to assume almost magical properties as a wholly salutary chemical. Today, every science textbook and encyclopaedia refers to its capacity for inhibiting dental decay, especially among children.

The experts told us that fluoride both helped the remineralisation of enamel (the outer layer of the teeth) and also prevented the bacteria in dental plaque from producing the acid that causes decay. As the dental authorities became ever more zealous in the promotion of fluoride, it was delivered to the population, either through the fluoridation of the public water supply, or by fluoride in toothpaste and other dental supplements.

Fluoridation was essentially a socialist health policy. In the phrase often cited by dental professionals, it gave poor kids rich teeth.

There were those who counselled caution, on the grounds that fluoride is a cumulative poison; and that, in any case, rates of dental decay were also falling dramatically in countries that did not espouse its use. But in Britain, the concept of fluoride as a supremely benign aid was instilled in generations of dental students.

The idea was an American import. As a whole, Europe has never been persuaded. Only about 2 percent of Europe has artificially fluoridated water supplies, and virtually all of that is accounted for by Britain (10 percent of the country) and Ireland (66 percent). In England, Birmingham fluoridated in 1964; Britain's second city was desperate to be first at something.

Yet, on one obvious level, the fluoridation of the public water supply is an absurd concept. We all know what happens to the nation's water: about one-third is lost in leakages before it ever gets anywhere; seven-eighths of the rest is used by industry, and much of the remainder literally goes straight down the toilet. The proportion that reaches our teeth is tiny indeed.

Some industries — notably those dealing with photographic or X-Ray equipment — need first to remove the fluoride. People on dialysis cannot receive fluoridated water. Mothers with newly-born babies are best advised not to make up baby formula with fluoridated tap-water.

Assuming, for the moment, that fluoride actually achieves everything that is claimed for it with respect to teeth, how do those fluoride ions know that, when they come cascading into the body, they must strengthen the resistance of teeth to decay, but do nothing else at all. Isn't it common sense to assume that if teeth are being affected, then so are other parts of the body?

Gar Smith

If children are not supposed to swallow fluoride toothpastes, why are they flavored to taste like strawberry and watermelon? Wouldn't the kids be safer if toothpastes tasted like broccoli?

Of all the fluoride taken into the body, about 50 percent is excreted. The rest remains. In its major 1993 report, "Health Effects of Ingested Fluoride," the US National Research Council (NRC) pointed out that, "Half the fluoride [taken in by the body] becomes associated with teeth and bones within 24 hours of ingestion. In growing children, even more of the fluoride is retained." For many years, dental authorities have confidently asserted that whereas fluoride's impact on the teeth is striking and wonderfully beneficial, its impact on bones, even over a lifetime, is non-existent. There is now increasing evidence that this is exactly what it seems: an illogical proposition.

Bad to the Bone

During the Nineties, a steady trickle of scientific reports has found a "statistically significant" association between water fluoridation and increased risk of hip fracture. The suggestion is that the hip needs tensile strength, but that this is destroyed by fluoride. One study monitored the hip fracture rates of white women across 3,000 counties in the US. Another compared the incidence of hip fracture among mainly Mormon communities in Utah. This was of particular interest because it could exclude confounding factors such as smoking and alcohol consumption. The study found a "small but significant" additional risk of hip fracture among both men and women exposed to artificial fluoridation at one part per million (ppm) — precisely the level at which water is fluoridated in the UK.

The urgent need for further investigation was made even plainer by the publication of an alarming study by the University of Bordeaux, published in the *Journal of The American Medical Association*. This measured rates of hip fracture among elderly citizens in 75 parishes of southwestern France, and compared the concentrations of fluoride in the water (which, in this case, was naturally fluoridated). The study found that people living in fluoridated areas suffered 86 percent more fractures than people in non-fluoridated parts.

One irony of this research is that those who lobby in favor of fluoridation always refer to the savings to the National Health Service in costs of dental care — however, if fluoridation does indeed lead to an increased incidence of hip fracture, then the overall costs to the NHS would be far greater than these projected savings. Hip fracture, a serious and some-

Adapted from an article originally published in The Guardian Weekend *[119 Farringdon Road, London EC1R 3ER England], June 7 1997. This article was a winner of the 1997 Project Censored Award. It shared the honor with the* Australian and New Zealand Journal of Public Health *and the Worcester, Massachusetts* Telegram & Gazette. *Reprinted with permission.*

times life-threatening condition, is one of the most expensive items on the NHS budget.

Cases of crippling skeletal fluorosis, a condition directly caused by fluoride, are exceptionally rare, except in countries of naturally high fluoride levels such as India; but the early stages of the condition could perhaps be triggered by artificially-fluoridated water supplies. Fluoride, which is deposited in mineralising new bone more easily than existing bone, distorts the natural regeneration of the bone. As fluoride accumulates, the bones become thickened and develop outgrowths. Tendons and ligaments may then be affected and nerves may become trapped and damaged.

The result could be a mounting toll of skeletal problems — from occasional stiffness or pain in the joints, to backache and osteoarthritis. These problems collectively form one of the major causes of absence from work in Britain, so their impact on the economy — even aside from the well-being of the individual — is considerable.

Bone Cancer & Down's Syndrome

Research undertaken in the US for the National Toxicology Program (NTP) in 1990 and 1991 showed "a possible increase in osteosarcomas in male rats" exposed to fluoride. Osteosarcoma is rare, but it is one of the principal cancers of childhood. As a result of the NTP report, the Department of Health in New Jersey commissioned work to assess the incidence of osteosarcoma in the state in relation to water fluoridation. The results were astonishing: they indicated that in male children (under the age of 20), the risk of osteosarcoma was between two and seven times greater in fluoridated water areas.

"Are you telling us that we're reducing children's IQs by putting fluoride in toothpaste?" She replied, "Well, basically, yes." She did not receive further funding.

Dr Sheila Gibson, of the Glasgow Homoeopathic Hospital, reported further serious findings in a paper in *Complementary Medical Research*. By adding sodium fluoride to blood samples, she demonstrated that fluoride impaired the functioning of the immune system.

There also is concern about the genotoxicity of fluoride and its possible role in the cause of increased levels of infant mortality and Down's Syndrome births. The West Midlands Perinatal Audit reported that the city had "significantly higher" rates of stillbirth and neonatal mortality than the average for England and Wales.

Could this be attributable to fluoride? In an as-yet unpublished paper, Ian Packington, a toxicologist on the advisory panel of the National Pure Water Association (an anti-fluoride campaign group), records that in the years 1990-92 perinatal deaths in the fluoridated parts of the West Midlands were 15 percent higher than in neighboring unexposed areas such as Shropshire and Herefordshire. From an analysis of Department of Health statistics, he concluded that in the period 1983-86 cases of Down's Syndrome were 30 percent higher in fluoridated than non-fluoridated areas.

These were not isolated findings. In the 1970s, Dr. Albert Schatz reported that the artificial fluoridation of drinking water in Latin American countries was associated with increased rates of infant mortality and deaths due to congenital malformation. As long ago as the 1950s, Dr. Ionel Rapaport published studies showing links between Down's Syndrome and natural fluoridation.

Brushing Your Brain with Fluoride

Unlike fluorine — which is one of nature's most reactive elements — the fluoride ion is very stable. It was unclear how it could potentially cause prenatal damage of this kind until, in 1981, the *Journal of The American Chemical Society* reported that fluoride could form strong hydrogen bonds.

This could indeed have serious repercussions for biological systems, with the consequences of affecting proteins, other molecules and DNA. Dr John Emsley, the scientist conducting the research, wrote that, "We believe we have found an explanation of how this reputedly inert ion could disrupt key sites in biological systems." Even so, worse was still to come.

The NRC report on the effects of fluoride clearly conceded that there were "inconsistencies" in the data about fluoride toxicity. One area it did not examine at all was the effect of fluoride on the brain and central nervous system — even though the results of relevant Russian studies in the 1970s were by then widely known. These demonstrated that workers suffering from exposure to fluoride in the workplace exhibited signs of impaired mental functioning.

The NCR's omission was put into sharp perspective with the publication in 1995 of work by the neurotoxicist, Dr. Phyllis Mullinex. In the 1980s, she developed a sensitive test using animal models to ascertain the effects of neurotoxins on the central nervous system. As a result, she was recruited to head the department of toxicology at the Forsyth Dental Institute in Boston. Everything went well until she stepped into politically-sensitive territory by using her system to test the effects of fluoride.

She noted disruption to the behavior patterns of rats, and concluded that fluoride adversely affected the brain. She went on to show that fluoride accumulated in brain tissue, and that its effects depended on the age of exposure (young rats were more vulnerable). She also determined that these effects were measurable at a lower level of exposure to fluoride than was necessary to produce damage to the bones.

In order to receive her next round of funding, she presented her interim findings to representatives of the major toothpaste manufacturers. She was asked, "Are you telling us that we're reducing children's IQs by putting fluoride in toothpaste?" She replied, "Well, basically, yes." She did not receive further funding.

Although her paper was peer-reviewed and published in *Neurotoxicology And Teratology*, she was told that her work was "not relevant to dentistry" and sacked from her post at the Forsyth. (She retained a second post at Harvard Medical School.) She sued the Forsyth for wrongful dismissal and won what is believed to be a substantial out-of-court settlement.

The disturbing conclusions of her work have been buttressed by new studies from China, published in the journal *Fluoride*. Researchers compared the IQs of children in areas of low and high natural fluoridation and discovered that children in the low-fluoride area had higher IQs. There was some criticism that this work had not taken sufficient account of possible confounding factors. So a small-scale study was initiated, comparing two villages — Sima, with a high level of natural fluoride, and Xinhua. The results were the same as before. The children exposed to higher levels of fluoride had lower IQs.

Fluoridation. What's in It for Us?

In October 1990, a document labeled "For Reference *Only* — *Do Not* Send Out" was prepared by Lucier Chemical Industries, Ltd. and sent to the city of St. Petersburg, Florida. LCI purchases fluorosilicic acid (aka hydrofluosilicic acid) from Cargill Fertilizer, Inc. which it sells to St. Petersburg, which pours it into the municipal water supplies.

The confidential memo described the fluoridation agent as a "highly corrosive" solution, "white to straw yellow in color" and containing the following ingredients:

	Percent (by wt.)
HcSiF6 (hydrofluosilicic acid)	24%
Fluorine	18.5%
Heavy metals, as lead, Pb	0.0002%
Phosphorus	0.200%
HF (hydrogen fluoride)	1.000%
Arsenic	0.0035%
Barium	0.0002%
Cadmium	0.0004%
Chromium	0.0003%
Iron	0.100
Iodine	0.0015%
Lead	0.00005%
Mercury	0.0000001%
Selenium	0.000003%
Silver	0.0004%

Damn the Studies: Full Speed Ahead!

Paul Connett is a professor of chemistry at St. Lawrence University in New York state and an international authority on environmental toxins. "I now realize that, because the pro-fluoride lobby has successfully portrayed the anti-fluoridationists as a bunch of crackpots, people have been kept away from this issue. In fact, once I looked into the literature and was, quite frankly, appalled by the poor science underpinning fluoridation, I had grave concerns about the wisdom of putting this toxic substance into our drinking water."

In the US, at the same time that the first fluoridation scheme was being introduced, scientists were admitting (in documents hitherto secret, but now disclosed under the Freedom of Information Act) that they had no idea what the effects of low-level exposure would be.

The first such scheme was introduced in Grand Rapids, Michigan, in 1945 as a long-term pilot study. Over a 15-year period, it was to be compared with an unfluoridated control city, Muskegon, to determine whether fluoride actually did benefit dental health. The Americans couldn't wait 15 years, however; or even two. The following year, six cities opted to fluoridate. In 1947, 87 did, including Muskegon. In a prime example of bureaucrats pre-empting science, the authorities decreed that it was unfair to deprive its citizens of the "benefits" of fluoridation. The 15-year study had run for just 18 months.

> *There has never been a single long-term, scientifically inviolable study of fluoridation. The most remarkable aspect of the conduct of the dental lobby has been... its cowardice in not confronting the huge commercial sugar interests.*

Thus there has never been a single long-term, scientifically inviolable study of fluoridation. And this is against a background of steady improvements in dental health, with the widespread, indeed ubiquitous, availability of fluoride toothpaste. But since cleaning one's teeth is always beneficial, how much real additional advantage does the fluoride confer? There are, of course, those who argue that the Grand Rapids study was not allowed to run its full course precisely because the results would have capsized the pro-fluoride arguments.

Fluorosis: The Price We Pay

Why has there been such unrelenting administrative pressure to fluoridate? Conspiracy theorists would point to the confluence of interests of the sugar industry, keen to identify any method of improving dental health which did not involve consuming less sugar, and huge industrial concerns, such as aluminium manufacturers, petro-chemical and fertiliser industries, for all of whom fluoride was a waste product and a dangerous pollutant. Accordingly, they welcomed the opportunity both to launder the image of fluoride and (in some instances) to sell to water companies something they would otherwise have had to pay to get rid of.

The dental profession itself tells a very different story. In 1945, a physician noticed something different about the teeth of children living in high fluoride areas: they were mottled and discolored. The condition — fluorosis — was caused by fluoride attacking the enamel of the permanent teeth while they were being formed in the gums. When the teeth erupted, they had unsightly stains on them.

However, the physician also believed that the children with fluorosis had fewer dental caries. Thus, the link was made, and the aim was formulated of trying to fluoridate to a uniform level for the benefit of dental health. The optimal level, at which benefits to teeth could be reconciled with an acceptable level of fluorosis, was determined as 1 ppm of fluoride in water.

From the outset, the danger of fluorosis was inherent in the dental lobby's advocacy of fluoride — it was recognized that some children would need to sacrifice their appearance for what was deemed to be the greater good. In recent years, however, dental fluorosis (the majority of cases are only mild) has been increasing. In the US, the NRC expects fluorosis to occur, albeit in a mild form, in 10 percent of the population. Statistics showed that in one unnamed city with a fluoride concentration of twice the recommended level, the prevalence of dental fluorosis in children was 53 percent.

Fluorosis strikes when the child is at a psychologically vulnerable age. At an international conference on fluoridation in Birmingham in 1995, evidence was presented that, in Australia, "even mild [fluorosis] was associated with psycho-behavioural impacts." Worse yet, dental fluorosis is merely the *visible* sign of fluoride's effects. Are there other kinds of damage that cannot be seen?

The worldwide increase in fluorosis is hardly surprising, as exposure to fluoride from sources other than the water supply has increased immeasurably over the past 25 years. Even

for those of us not living in fluoridated areas, there is constant exposure from toothpaste, from other dental products, from fruits and vegetables (which retain fluroide from pesticide residues) and from drinks such as tea. Tea leaves have naturally high fluoride levels since tea grows best in a fluoride soil.

In 1945, the dental authorities set the optimal level for fluoridation at 1 ppm; and the optimal level today is still 1 ppm, despite the fact that overall exposure to fluoride has increased significantly since 1945. The absolute level of fluoride exposure is of critical importance because the whole debate is so finely balanced.

As Professor Connett explained: "From a toxicological point of view, the gap between the therapeutic dose — the level at which fluoride is supposed to benefit teeth — and the toxic dose, at which it begins to do serious harm, is very small. Usually, you want a factor of a hundred between the two. In this case, it's tiny. The optimal level in drinking water is one ppm. The maximum contaminant level, as prescribed by the US Environmental Protection Agency, is 4 ppm. That gap is far too small for public safety." [*Note: In 1986, the EPA raised the maximum exposure level from 2.4 ppm to 4 ppm. See story on page 11.*]

Faced with accumulating information of this kind, the dental administrators and pharmaceutical companies have been quietly moving the goalposts.

No one should be taking fluoride supplements, especially if they live in a fluoridated area. The problem here is that many millions of people probably have no idea whether they're living in a fluoridated area or not, because no one has ever had the courtesy to tell them. To quote the leading textbook, *Essentials Of Dental Caries*: "topical fluoride preparations [toothpaste et al] should be applied carefully because of their potential toxic effects." Children should be supervised by parents when brushing their teeth. They should use only a pea-sized amount of fluoride toothpaste (though no one would ever suppose as much from watching the television commercials) and should on no account swallow it. The chairman of the British Fluoridation Society, Professor Mike Lennon, blames the increased incidence of dental fluorosis on children "abusing" (that is, swallowing) toothpaste.

Since it is difficult not to swallow toothpaste, and since fluoride is in any case absorbed through the gums, parents may instead like to purchase non-fluoride toothpaste — were it not that this is almost impossible in many parts of the country, as the supermarkets and pharmaceutical retailers have severely restricted consumer choice.

So, the real route to lasting dental health remains, as ever, regular dental hygiene and a nutritious diet. In fact, the most remarkable aspect of the conduct of the dental lobby has been not its unquestioning espousal of fluoride but its cowardice in not confronting the huge commercial sugar interests. After all, dental caries were unknown before refined sugars.

The possible subtle effects of long-term exposure to low levels of fluoride can no longer be ignored. Those who wish to extend fluoridation schemes throughout the country tell us that there's "no evidence" that it causes harm. We must bear in mind how carefully the authorities have avoided gathering the evidence.

The final irony is that fluoridation, having been introduced to bridge the socio-economic gulf in society, probably benefits the poor least of all. It is precisely those suffering poor nutrition, and hence vitamin and mineral deficiencies, who will be most vulnerable to fluoride's toxic effects.

Fluoride in the News

"Aluminum-induced neural degeneration in rats is greatly enhanced when the animals were fed low doses of fluoride. The presence of fluoride enhanced the bioavailability of aluminum (Al) and caused more Al to cross the blood-brain barrier and be deposited in the brain. The pathological changes found in the brain tissue of animals given fluoride and aluminum-fluoride were similar to the alterations found in the brains of people with Alzheimer's disease and other forms of dementia."
— ***Brain Research*** *(vol. 784:1998)*

"Roger Masters, a Dartmouth professor of government, and Myron Coplan, a retired chemical engineer, have gathered statistical evidence [*in an EPA-funded study*] indicating that children who live in areas where the drinking water has been treated with silicofluorides have elevated levels of lead in their blood and higher rates of violent crime, which may be attributable to the lead."
– ***The Valley News***, *Vermont, June 22, 1998*

"In October 1944, the *Journal of the American Medical Association* published an editorial stating that 'the use of drinking water containing as little as 1.2 to 3 parts per million of fluoride will cause... osteosclerosis, spondylosis and osteopetrosis.' In 1990, the American National Toxicology Program announced that it had established a clear link between fluoride and a type of bone cancer called osteosarcoma. However, it was in the interest of many powerful bodies that fluoride be added to our drinking water supplies. This included the sugar industry and the aluminium industry, which was desperate to get rid of the vast amount of fluoride waste that its activities had generated."
— ***The Ecologist***, *March/April 1998*

"New research suggests young children may be getting more fluoride than they need through baby foods. The researchers analyzed the fluoride concentration of 238 commercially available infant foods. The results reveal ready-to-eat foods with chicken had the highest fluoride concentrations. The researchers also found that dry infant cereals that are reconstituted with fluoridated water may noticeably increase the levels of fluoride in a child's daily intake."
— ***Journal of the American Dental Association***, *August 23, 1997*

"[Fluoride is a poison]. That's the message of the new warning labels required by the Food and Drug Administration on all fluoride toothpastes and dental care products shipped as of April 7. In areas where the drinking water contains fluoride, children who swallow even [a] pea-sized amount of toothpaste are getting too much fluoride and are at risk for fluorosis."
— ***The Washington Post***, *June 16, 1997*

"An analysis of survey data collected by the National Institute of Dental Research concludes that children who live in areas of the US where the water supplies are fluoridated have tooth decay rates nearly identical with those who live in nonfluoridated areas."
— ***Chemical & Engineering News***; *May 8, 1989*

"When people open their next town water bills, they will notice a new warning about the potential side effects of fluoridation. The warning will say the town recommends pregnant women, parents of children under 3 and people sensitive to fluoride consult their doctors."
— ***The Middlesex News***, *Massachusetts, March 10, 1998*

Fluoridation and Hip Fractures

by John R. Lee, M.D.

The costs and health effects of osteoporotic fractures in the US are enormous. The total cost of fracture care is now about $9 billion/year. It is estimated that about 350,000 hip fractures occur per year and the incidence is rising.

A study by the University of Iowa's Department of Preventive Medicine and Environmental Health, calculated that the lifetime risk of a fracture of the hip, spine or distal forearm is almost 40% in white women and 13% in men from age 50 years onward. Hip fractures account for 87-100% of fracture-related nursing home placements and 87-96% of short-term fracture costs.

In an effort to treat osteoporosis and prevent hip fracture, some doctors administer "therapeutic" doses of fluoride. Four US studies have examined the effect of these "therapeutic" doses and all of them found that, even though bone density appeared to increase, hip fracture rates increased within three years of treatment. In addition, all reported significant periarticular joint pain and gastrointestinal side effects in the treated subjects.

Dr. L. V. Avioli, Shoenberg Professor of Medicine at the Washington University School of Medicine, concluded that "sodium fluoride is accompanied by so many medical complications and side effects that it is hardly worth exploring in depth as a therapeutic mode for post-menopausal osteoporosis." Dr. Saul Genuth, chairman of the FDA advisory committee that analyzed the fluoride/fracture findings, was quoted in the *Medical World News* as saying the FDA "should quietly forget about fluoride."

More recently, attention has shifted to lower dosages of fluoride, such as found in fluoridated water. There are now at least eight studies that showed an increase of hip fracture incidence in fluoridated communities. They are summarized here:

- In 1986, M.R. Sowers *et al*, in a retrospective study, found an increased fracture rate in both pre- and postmenopausal women relative to their water fluoride exposure.
- In 1991, M.R. Sowers *et al* completed a prospective study again showing that water fluoride was correlated with more than double the unfluoridated fracture rates.
- In 1991, Jacobsen *et al* showed a very strong positive correlation of hip fracture to fluoridation.
- In 1991, C. Cooper *et al* showed a statistically significant increase of hip fracture incidence in England relative to fluoride content of drinking water ranging from 0 to 1 mg/L [ppm].
- Also in 1991, C. Keller compared hip fracture rates in 216 US counties with natural fluoride concentrations in drinking water and found significantly higher fracture rates in counties with fluoride levels of >1.2 ppm.
- D.S. May and M.G. Wilson reported finding that, as the percentage of persons exposed to fluoride in water increased, the hip fracture rate generally increased.
- In 1992, C. Danielson *et al* reported that the risk of hip fracture was approximately 30% higher for women and 40% higher for men in fluoridated communities. Among women at age 75, the risk was about twice as high in fluoridated communities.
- In 1995, H. Jaqmin-Gedda *et al*, scientists from the University of Bordeaux, France, studied hip fracture rates in 75 civil parishes in southwestern France and found (after adjustment for multiple alternative variables) an increased risk [odds ratio] for hip fracture of 1.86, i.e., 86% more likely, in parishes with water fluoride levels higher than 0.11 ppm.

In addition, a number of studies suggest fluoride induces pathologically mineralized bone and a deterioration in the overall strength of bone. A 1994 report by P. Fratzl *et al* in the *Journal of Bone & Mineral Research* described abnormal bone mineralization after fluoride treatments. In that same year, C.H. Sogaard *et al* reported a marked decrease in trabecular bone quality after just five years of sodium fluoride therapy. Pediatric orthopedists are finding that, here in the US, sports injuries to the young are rising sharply — ranging from stress fractures of the lower spine in young gymnasts to tendonitis in swimmers.

In 1992, orthopedic surgeon Carl L. Stanitski observed: "We are seeing more and more stress fractures in children and more and more injuries caused by repetitive use." Some might argue that overuse and too much training are the cause, but others are concerned that something is causing defective bone and connective tissue of US kids, and that something might well be fluoridation.

Conclusion: All studies of fracture rates relative to long-term fluoridation exposure indicate a significant increase in fracture risk from fluoridation. The increased fracture risk due to fluoridation appears to range from 40-100%, depending on the age of the subjects studied. For women in their seventh decade who have been exposed to life-long fluoridation, the risk of hip fracture is approximately doubled. The risk increases with fluoride concentration at all levels over 0.11 ppm. Increased bone and connective tissue injuries of US youngsters should alert us to the probability that our high fluoride environment is adversely affecting our youngsters as well as our elderly.

{CITATIONS AVAILABLE ON REQUEST}

John R Lee, MD, is the former director of the Marin Medical Society in California and the author of Optimal Health Guidelines, Optimal Fluoridation *and* Gilbert's Disease and Fluoride Toxicity. *The full text of this article was published in the research journal,* Fluoride *(Vol. 26 No. 4, pages 274-277, 1993).*

JAMA on Fluoride and Hip Fractures

"Hip Fractures and Fluoridation in Utah's Elderly Population,' a study by C. Danielson *et al* [*Journal of the American Medical Association*, August 12, 1992, 268:746-8], compared the incidence of femoral neck fractures in a community with long-standing water fluoridation (to 1 ppm) with the incidence in two communities without water fluoridation (less than 0.3 ppm).

"The findings of this report support other epidemiologic studies suggesting that fluoride increases the risk of hip fracture."

— *Journal of the American Medical Association*

"A review of recent scientific literature reveals a consistent pattern of evidence – hip fractures, skeletal fluorosis, the effect of fluoride on bone structure, fluoride levels in bones and osteosarcomas – pointing to the existence of causal mechanisms by which fluoride damages bones.... [Fluoridation] proponents must come to grips with a serious ethical question: is it right to put fluoride in *drinking* water and to mislead the community that fluoride must be ingested, when any small benefit is due to the *topical* action of fluoride on teeth."

— *Australian and New Zealand Journal of Public Health*, 1997

Impact of Artificial Fluoridation on Salmon In the Northwest US and British Columbia

by Richard G Foulkes, MD and Anne C. Anderson, RPN

In the US Northwest, species of salmon using the Snake-Columbia River system, are listed as "endangered." On the North Thompson River of British Columbia, Canada, sperm banks are being employed to preserve salmon species. Proposed water diversion on the Nechako River, in British Columbia, may threaten the internationally important Fraser River fishery.

Writing in the quarterly magazine, *The New Pacific*, in January 1994, Joseph Cone reported that the annual migration of salmon in the Snake-Columbia River system had declined over the past century from an estimated 10-16 million to 2 million in 1991. He pointed out that "the problem is enormously complex — biologically, administratively and economically." His article and reports in the media have stressed problems with harvesting; loss of habitat through poor forestry practices, livestock and human settlement; and dams built for power and irrigation. Little emphasis is placed on the effects of pollution of water by toxic substances such as fluoride.

The aluminum industry is the chief beneficiary of power dams on the Columbia River System, and it is the fluoride wastes from smelters that first come to mind as sources of fluoride pollution. However, there is another potential source of contamination — the artificial fluoridation of community water supplies for the avowed purpose of improving dental health.

Fluoride and "Critical Habitat"

In discussions of "critical habitat" for endangered salmon species, all of the possible components must be evaluated. This study examines the possibility that artificial fluoridation of drinking water in communities along the course of salmon rivers is a factor to be included.

The US Environmental Protection Agency (EPA)[1] and the Province of British Columbia[2] adhere to a "permissible level" of 1.5 ppm (1.5 mg/L) for fluoride discharged into fresh water. BC's "recommended guideline" is currently 0.2 ppm fluoride ; but this does not have the force of legislation. Neither the Minister of the Environment nor the Washington State Department of Ecology requires fluoride estimations for sewer effluent permits as it is considered fluoride is not significantly toxic to aquatic life in concentrations expected in discharges.[3, 4]

A review of the literature and other documents, including as court transcripts, reveals that levels below 1.5 ppm have been shown to have both lethal and other adverse effects on salmon. Evidence presented by the EPA and other government bodies responsible for the environment suggests that harm can come to aquatic life only at concentrations that far exceed those in discharges from fluoridated cities. Both Groth[5] and Warrington[6] point out that many factors influence susceptibility of fish to fluoride: temperature; water hardness; pH; chloride concentration; and, the strain, age and physiological and reproductive condition of the fish.

Groth points out that there are serious problems with laboratory experiments as opposed to field studies. In lab tests, "... many of the organisms tested for fluoride toxicity did not experience effects until levels of fluoride higher than those which might realistically be encountered in the environment were attained." Groth concluded that the finding can be misleading: the techniques of measurement may be inadequate to detect effects, and these may be at the population rather than individual level.[5]

There are studies showing the effect of water temperature and hardness. Angelovic and others[7] showed lethal effects on rainbow trout related to temperature. Using sodium fluoride at the same degree of hardness (estimated at 44 by Warrington[6]), at 7.2 degrees C over an exposure period of 240 hours, Angelovic determined that the LC50 (the lethal concentration required to kill 50% of the tests subjects) was 5.9-7.5 ppm. At 12.8 degrees C, half the trout died at concentrations of 2.6-6.0 ppm. Neuhold[8] reported the same result for 12.8 degrees C and the same degree of hardness. Pimental and Bulkley,[9] using a constant temperature of 12 degrees C, monitored the mortality of rainbow trout over a 96-hour period in waters with hardness levels of 17, 49, 182 and 185 ppm. The LC50 was associated with fluoride levels of 51, 128, 140 and 193 ppm respectively.

In British Columbia, where the softness of major salmonid water courses is the rule, Warrington combined the findings of Angelovic, Pimental and Bulkley to calculate that the chronic threshold for rainbow trout at 12 degrees and water hardness of 10 mg/L (calcium carbonate) is 0.2 ppm.

Smelters vs. Salmon

In a field study, Damkaer and Dey[10] (*See sidebar, page 10*) demonstrated that high salmon loss at John Day Dam on the Columbia River, 1982-1986, was caused by the inhibition of migration by fluoride contamination from an aluminum smelter located 1.6 km [one mile] above the dam. In 1982, the average daily discharge of fluoride was 384 kg and the salmon loss was 55%. In 1985, discharge averaged 49 kg and was accompanied by a concentration of 0.2 ppm and a salmonid loss of 5%.

Damkaer and Dey confirmed the cause-and-effect relationship by means of a two-choice flume for fluoride gradient salmon behaviour tests. These determined that the "critical level" was 0.2 ppm.

There are other studies that indicate that fluoride at levels below 1.5 ppm have lethal and other adverse effects on fish. Delayed hatching of rainbow trout have occurred at 1.5 ppm;[11] brown mussels have died at 1.4 ppm[12]; an alga (*Porphyria tenera*) was killed by a four-hour fumigation with fluoride with a critical concentration of 0.9 ppm[13]; and, levels below 0.1 ppm were shown to be lethal to the water flea, *Daphnia magna*.[14] These latter two studies suggest that salmon species also may be af-

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fected by fluoride-induced reduction of food supply.

Documents used in a 1961 court case involving Meader's Trout farm in Pocatello, Idaho,[15] contain evidence that between 1949 and 1950 trout damage and loss was related to fluoride contamination due to rain washing airborne particles from leaves into hatchery water at levels as low as 0.5 ppm. This evidence suggests that the "safe level" of fluoride in the fresh water habitat of salmon species is not 1.5 ppm but, 0.2 ppm.

Is City Water Deadly to Salmon?

In fluoridated areas, drinking water obtained from surface water with an average fluoride concentration of 0.1-0.2 ppm[16] is raised to the "optimal" level of 0.7-1.2 ppm by the addition of sodium fluoride, hydrofluosilicic acid, or sodium silicofluoride. [*Note: In 1985, the EPA raised the Maximum Contaminant Level to 4 ppm.*]

Fluoride, in community drinking water, enters the fresh water ecosystem in various ways. Surface run-off from fire-fighting, washing cars, and watering gardens may enter streams directly or through storm sewers at optimal concentration, 0.7-1.2 ppm. Most enters during waste water treatment.

Masuda[17] studied a large number of cities and calculated the concentrations in waste water that were in excess of the concentration present in the cities' water supplies. In raw sewage, this was 1.30 ppm; primary treatment reduced this slightly to 1.28 ppm; secondary treatment to 0.39 ppm. Singer and Armstrong[18] found 0.38 ppm in unfluoridated sewage and 1.16-1.25 ppm in fluoridated sewage.

It is clear that, in the case of artificially fluoridated communities, the concentration of fluoride in both surface run-off and sewer effluent exceeds 0.2 ppm.

Studies show that elevated concentrations in fresh water receiving fluoridated effluent may persist for some distance. Bahls[19] showed that effluent containing 0.6-2.0 ppm discharged into the East Galletin River from the city of Bozeman, Montana, did not return to the background level of 0.33 ppm for 5.3 km [3.3 mi.]. Singer and Armstrong[18] reported that a distance of 16 km [9.9 mi.] was required to return the Mississippi River to its background level of 0.2 ppm after receiving the effluent of 1.21 ppm from Minneapolis-St Paul.

Although dilution reduces concentration over distance, the amount of fluoride in effluent is either deposited in sediment locally or is carried to estuaries where it may persist for 1-2 million years.[16] Fluoride residues may re-contaminate the water anew if dredging were to take place.

Sewage sludge, a product of secondary treatment systems must contain high concentrations of fluoride. However, this is seldom measured in the jurisdictions contacted for this study.

When spread on agricultural land or forests, sewage sludge becomes a hazard in the "critical habitat" of salmon species. During application, aerosols are created that may be ingested by animals and may contaminate surface water. The sludge adds toxic substances to the soil. Fluoride can move into ground water and the run-off of soil particulates may enter streams that play a role in the life-cycle of salmon.

Effluent from fluoridated cities is also discharged into tidal waters. While sea water has been shown to have a higher concentration of fluoride than unpolluted surface water,[16] contaminated rivers flowing into an estuary (as well as direct discharge of effluent) can elevate the amount of fluoride.

From information that is available, 0.2 ppm in the fresh water ecosystem in the US Northwest and British Columbia appears to be the appropriate safe level for salmon species rather than the 1.5 ppm non accepted. Decreases in water volume and/or flow velocity have the potential to increase fluoride concentration. Increased water temperature will enhance fluoride toxicity. Fluoridation deserves to be looked at as a component of "critical habitat" along with the more publicized factors.

A review of the US Department of Health and Human Services publicaton, *Fluoridation Census 1985*,[21] shows that along the course of the Snake River from the Idaho-Wyoming border to its junction with the Columbia River in Washington State, there are three water systems fluoridated at 1.0 ppm. Eight artificially fluoridated water systems are located on the banks of the Columbia from the Canadian border to the mouth. That is, a total of 11 artificially fluoridated communities are located along the Columbia-Snake River system. Has this played a role in the catastrophic decline in salmonid stocks in this once highly productive ecosystem?

Illustration by Lil Kingerly, Riverdale School, Oregon

The declining salmon returns to the North Thompson, especially of Chinook and Coho, is threatening the existence of species. The City of Kamloops, which contributes run-off and sewage effluent to the North Thompson, is artificially fluoridated. Could this fluoride contribute to migration delay as occurred at the John Day Dam? Could the decline be related to loss of basic feed or hatching abnormalities associated with toxic levels of fluoride?

Effluent levels in Kamloops have been measured at 0.6-1.2 ppm by city employees (personal communication) but no field studies on the effect on salmon species have been carried out.

The Fraser River of British Columbia begins in the Rocky Mountains and travels west to the city of Prince George, where it is joined by the Nechako River carrying water from the western portion of the Province. From there, it flows south to enter the Strait of Georgia after it is joined by numerous tributaries, the largest of which is the Thompson River.

Prince George, like Kamloops, is artificially fluoridated. Has fluoride effluent from Prince George contributed to reported declines in Chinook and Coho stocks in the Nechako? If the diversion of water from the Nechako River (as proposed in the "Kemano II" hydroelectric project) takes place and lowers the water level, slows the flow and raises the temperature of the Nechako Fraser River system, will the toxic effect of fluoride from Prince George and Kamloops be enhanced, putting at risk not only on Chinook and Coho but the Sockeye upon which fishers of both the US and Canada depend?

The decline in salmon stocks, especially Chinook and Coho, is a major economic problem for both commercial and sport

fisheries. "Critical habitat restrictions" are currently being formulated. In the US, the Chinook salmon is being considered for listing under the Endangered Species Act. In BC, the Kemano II hydroelectric project is currently "on hold" and severe restrictions have been placed on the harvesting of both Cinook and Coho salmon. There has been no change in the "permissible level" of 1.5 ppm fluoride in either the US or Canada.

There are many questions, but until evidence to the contrary is available, based on impartial field studies, in order to protect salmon species in the US Northwest and British Columbia, the "critical level" of fluoride in fresh water should be 0.2 mgF/L.

The strategy for eliminating unacceptable levels of fluoride from the "critical habitat" of Northwest Pacific salmon consists in the immediate banning of artificial fluoridation and the rapid sunsetting of the current disposal practices of fluoride-producing industries.

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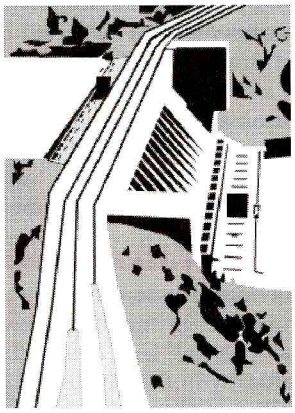

by Douglas B Dey and DM Damkaer

The upstream migration of adult spring chinook salmon in the Columbia River has been subject to unusually long delays at John Day Dam. During the spring migration period, average passage times for radio-tagged salmonids at John Day Dam were 158 and 156 hours in 1979 and 1980, respectively. In contrast, average passage time at Bonneville Dam was less than 48 hours and at The Dalles Dam it was less than 24 hours. In addition, passage times for salmonids in the fall of 1982 were twice as long at John Day Dam as they were at The Dalles and McNary Dams. The delay of nearly one week at John Day Dam appeared to contribute to increased mortality and may have affected the spawning success of migrating adult salmonids.

Migratory delays at John Day Dam were not decreased appreciably by changes in fishway entrance locations, water discharge volumes or configurations, or turbine operating conditions. The lack of response by migrating salmonids to flow alterations below the dam focused attention on the possibility that something in the water might be causing fish to avoid the fishways and delay their passage.

In 1982, preliminary studies conducted by CZES Division personnel suggested that the fish-passage delays might be related to contaminants discharged at an aluminum smelter outfall located on the Washington shore upstream from John Day Dam. In particular, high concentrations of fluoride in the vicinity of John Day Dam (0.3-0.5 mg/L in 1982) prompted investigators to focus sampling and research efforts on this contaminant.

In 1983 and 1984, behavior tests were conducted in which over 600 returning salmonids (chinook, coho, and chum salmon) were captured and tested with different concentrations of fluoride in a two-choice flume located in the spawning channel of Big Beef Creek, Washington. The conclusion from these experiments was that the behavior of upstream-migrating adult salmon would be adversely affected by fluoride concentrations of about 0.5 mg/L and that concentrations of 0.2 mg F/L were at or below the threshold for fluoride sensitivity of chinook and coho salmon.

Beginning in 1983 and continuing through 1986, fluoride discharges from the aluminum plant were greatly reduced. With the reduction in fluoride discharged from the aluminum plant, there was a corresponding drop in fluoride concentrations in the river near the outfall and John Day Dam. Concurrently, fish passage delays and interdam losses of adult salmon decreased to acceptable levels.

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From the North American Journal of Fisheries Management, *9 (1989), 154-162, National Marine Fisheries Service, Northwest Fisheries Science Center, April 1993.*

EPA Whistleblowers on Fluoride

Facts for Fluoridationists

by William L. Marcus, Ph.D

I would like to pass along a few tips that have gotten some responses from people who were previously pro-fluoridators. I like to use the approach that first states what everybody has agreed upon in the US, and progress to the more controversial.

- First, it is agreed by all people who think themselves knowledgeable about fluorides that the effect on teeth is limited to children three years or younger. Anyone else is exposed unnecessarily.
- When using the measures of filled, partially filled and missing teeth — comparing fluoridated and non-fluoridated water supplies the world over, including the US, there is either no difference or, more often, people using fluoridated water have more caries. Even very small amounts of fluoride cause brittle, hard-to-repair teeth.
- Studies demonstrate that the rate of hip fracture is at least double among people 65 years or older in fluoridated areas, and people who imbibe fluoridated water are also twice as likely to be hard-of-hearing.
- Fluoridating water increases lead exposure, especially to children, because the fluoride added to drinking water often has up to 400 mcg of lead per liter and the corrosive action of fluoride extracts lead from pipes and solder joints, increasing lead exposure of the young. Babies up to 3 months old absorb 16 times as much lead per unit of body weight than adults.
- Two large [fluoride-related epidemiological studies] in New Jersey and New York State determined the incidence of osteosarcoma (almost always fatal) in men under 18 years of age increased by 6- to 8-fold. An increase of this magnitude is *prima facie* evidence of a real ongoing effect.
- I find that people are simply not willing to believe that our government would condone the addition of a compound to the water supply that was not efficacious. This is why, in my opinion, it has not been possible to convince enough people of conscience to review the fluoride story.
- People remember that the National Academy of Science (NAS) released a report that sort of said fluoride was OK. They do not know that members hand-picked for the NAS panel were known to be pro-fluoride. They were not present when the NAS board calculated that the amount of fluoride ingested daily was far higher than previously believed.
- The [NAS panel] discovered that soft drinks, including Coke, Pepsi and Seven-Up were made by diluting concentrate with fluoridated water, that Kool-Aid, baby formula, etc., also have fluorides added. These exposures were not considered by the EPA when setting the current standard.
- The NAS did not allow me to explain that the levels of fluoride found in the bones of rodents who had osteosarcoma was lower than the level found in human adults exposed to allowable levels of fluoride.... No other compounds (including radioactive compounds) have been able to produce osteosarcomas in rodents.

William Marcus is a Senior Science Advisor with the EPA's Office of Science and Technology. In 1990, as a senior EPA toxicologist, Marcus questioned the safety of fluoride and was subsequently fired. He sued the EPA and won reinstatement – a major victory for whistleblowers.

The EPA's Fluoride Fraud

by Robert J. Carton, Ph.D

The fluoride in drinking water standard, or Recommended Maximum Contaminant Level (RMCL), published by EPA in the Federal Register on November 14, 1985, is a classic case of political interference with science.

The regulation is a fraudulent statement by the Federal Government that 4 milligrams per liter (mg/l) of fluoride in drinking water is safe with an adequate margin of safety. There is evidence that critical information in the scientific and technical support documents used to develop the standard was falsified by the Department of Health and Human Serivces and the EPA to protect a long-standing public health policy.

EPA professionals were never asked to conduct a thorough, independent analysis of the fluoride literature. Instead, their credentials were used to give the appearance of scientific credibility. They were used to support the predetermined conclusion that 4 mg/l of fluoride in drinking water is safe.

Ethical misconduct by EPA management included the following: EPA managers ignored the requirements of the law to protect sensitive individuals such as children, diabetics or people with kidney impairment. Contrary to law, they made the criteria for considering health data so stringent that reasonable concerns for safety were eliminated. Data showing positive correlations between fluoride exposure and genetic effects in almost all laboratory tests were discounted.

By selective use of data, they fit science to the desired outcome. They reported to the Administrator data demonstrating that dental fluorosis was an adverse health effect, but then hid this information from the public when the Administrator decided to call dental fluorosis a "cosmetic" effect.

EPA management based its standard on only one health effect: crippling skeletal fluorosis (CSF). They ignored data showing that healthy individuals were at risk of developing CSF if they happened to drink large quantities of water at the "safe" level of 4 mg/l. EPA's own data showed that some people drink as much as 5.5 liters a day. These people would receive a daily dose of 22 mg, which exceeds the dose necessary to cause CSF.

Management also relied on an April 1983 report from the Surgeon General that they knew was false. The concerns of an expert panel about the effects of fluoride on the bones of children, on the heart, for dental fluorosis and for the overall lack of scientific data on the effects of fluoride in US drinking, water were deleted from the EPA's report.

The report was submitted for public comment but was never altered to incorporate the information sent in by world-class experts. Any opnions contrary to the report were dismissed. What we have is actually a draft stamped "Final."

Objective scientific methods of data collection and analysis were avoided in favor of presenting information in a way that agreed with current policy.

Fluoridation is the greatest case of scientific fraud of this century, if not of all time.

In 1991, when this was written, Robert Carton was an EPA scientists and Vice-President of Local 2050 of the National Federation of Federal Employees, representing 1200 EPA professionals.

The Effects of Fluorides on Plants

by Alan Davison and Leonard Weinstein

Guava (Psidium guajava) in Brazil. Older leaves curled and dying. Note: The photos on these pages represent extreme examples of fluoride injury on the sensitive "indicator" plants.

Fluoride-induced symptoms have been described in many reviews (Weinstein and McCune 1970; Weinstein and McCune, 1971; Thomas and Alther 1966; Brandt and Heck 1977; Treshow and Pack 1970; Guderian et al. 1969; Hindawi 1970; Thomas 1961). The basis for the following description is Weinstein and McCune (1971) plus our own experience in the field in several countries .

Gaseous fluoride enters the leaf through the stomata (=pores) then it dissolves in the water permeating the cell walls. The natural flow of water in a leaf is towards the sites of greatest evaporation, which are the margins and tip. Carried by the water, the fluoride concentrates in the margins and tip, so it is these areas that generally are the first to show visible injury. Clearly, this concentration mechanism is one reason why fluoride can be so toxic to plants but there is an important corollary: Most of the leaf may have very little fluoride present and may function normally in terms of assimilation.

Generally, leaves are most sensitive when they are young and still expanding. Once fully developed, they may be many times more resistant. Therefore symptoms are more often seen in young, expanding leaves. Where fumigation is periodic, symptoms may reflect this as only those leaves that are at the sensitive stage of development when the fumigation occurs will develop injury. The rate at which symptoms appear depends on the weather. There can be a considerable lag between the time of exposure to the fluoride and the development of the symptoms.

Exposure to a high concentration causes necrosis of part or even the whole of the leaf. The term necrosis comes form the Greek *nekros* meaning a dead body. The tissues die.

The initial stages vary with species and both the speed of development of the symptoms and their appearance depend on the weather. In most monocotyledonous (narrow-leaved species including grasses and lilies) plants, the initial symptom is the development of chlorosis (= yellowing) at the tips and margins of elongating leaves.

In some species, the tissues take on a "water-soaked" appearance that looks very like early frost injury, then the tissues desiccate and change color. In some species the dead, necrotic areas are pale white to tan, in others they are brown and they may be black (eg in Populus spp.) or have reddish tinges.

Characteristically, there is a dark brown margin along the basal part of the necrotic area. This line of demarcation is very useful in identifying multiple exposures. The necrotic area is sharply delineated from the healthy portion of the leaf blade by a narrow band of chlorotic tissue sometimes streaked with red as in some varieties of Sorghum.

Apricot tree with affected bark.

Dead, dry pieces of leaf may become brittle and fall off, giving the leaf a tattered appearance. This is common in Chinese apricot and many *Populus* varieties. When very young leaves are injured in this way, the resulting leaf may only be a fraction of the normal size and completely mis-shaped.

Pine species vary greatly in sensitivity. For example, young ponderosa pine (*Pinus ponderosa*) needles first exhibit a lightening in color which turns light brown to reddish-brown at the tip and progresses basipetally along the needle. The discoloration is often accompanied by narrow, dark banded zones, which may be the result of intermittent exposures to fluoride spaced at different periods. Dark bands may also occur at the interface of necrotic and healthy tissues. Needles are born in groups (2, 3, 5 depending on species). They tend to be marked to the same extent.

Although necrosis is the symptom most frequently referred to in texts, often being called tip-burn, other symptoms are at least as common or, in some areas, more common.

In dicotyledonous (two seed-leaved) species, the initial symptom of fluoride effects on leaves is usually chlorosis of the tip, which later extends downward along the margins and inward toward the midrib. This chlorosis becomes more intense and extensive with prolonged exposure until the midrib and some veins appear as a green arborescent pattern on a chlorotic background. Continued exposure may lead to the tip becoming necrotic and falling off, leaving the leaf notched.

The symptoms produced in corn, sorghum, and some other grasses begin as scattered chlorotic flecks at the tips and upper margins of middle-aged leaves. As the symptoms progress, the flecking becomes more intense and extends downward, especially along the margins. The amount of chlorosis diminishes from the tip downward and from the margins toward the midrib. A greater degree of chlorosis is usually present at the arch of the leaf and wavy areas of the margin. At high fluoride concentrations, there is less chlorotic flecking and

a greater tendency for tip, marginal, and interveinal necrosis, or a transverse necrotic band at the arch of the leaf.

In young, developing leaves of broad-leaved species, and occasionally in petals, the translocation of fluoride to the margins and tips leads to a distorted shape. This may be accompanied by chlorosis at the margins and/or necrosis. The occurs because cells in the mid-parts of the leaf have low fluoride and expand normally but those on the margins are slower-growing, so the leaf buckles and distorts, becoming cupped and concave or convoluted like a savoy cabbage.

There is little information about the effects of fluoride on fruits but there are two important examples. Bonte and Garrec described fluoride-induced distortion of strawberry fruits. It was caused by lack of fertilization of the some of the seeds, which are responsible for hormonal-induced swelling of the fruit.

Peach also shows an unusual disorder induced by fluoride called "suture red spot" or "soft suture" of the fruit. It is characterized by premature ripening of the flesh on one or both sides of the suture toward the stylar (blossom) end of the fruit (Benson 1959; MacLean et al. 1984). The ripening of this tissue considerably precedes that of the normal fruit and is often accompanied by splitting of the flesh along the suture. At harvest, the affected areas are soft and often decomposing.

Finally, although the economic value of injury to a peach crop can be calculated, it is almost impossible to calculate or predict the effects of injury on other plants. If fluoride kills all of the leaves on a tree, then there will, of course, be an effect on subsequent growth. However, apart from this very rare occurrence, there is little or no relationship between visible injury and either growth or longevity. A plant that is visibly injured is not necessarily dying and there have been some cases of spectacular recovery of trees after severe injury. Many that show a significant degree of injury (such as *Populus*) continue to grow at normal rates. Conversely, just because a plant does not show visible injury does not mean that there is no effect of fluoride on assimilation or growth. Predicting the effects of fluoride is not a job to be undertaken lightly.

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Sweet corn (Zea mays) with flecking on leaves.

Douglas fir (Pseudotsuga douglasii). Needles turn light- to reddish-brown.

ADA Warns: Fluoride Risk in Baby Food

CHICAGO (ADA) — New research suggests young children may be getting more fluoride than they need through baby foods, according to a study published in the July 1997 issue of the *Journal of the American Dental Association* (JADA).

"Our main concern is that these young children could be at increased risk for mild to moderate dental fluorosis by ingesting too much fluoride," says Steven M. Levy, DDS, one of the authors of the JADA study from the College of Dentistry at the University of Iowa.

"It's important for parents to know how much fluoride their children are getting, whether it's through the water supply, fluoride supplements, fluoridated toothpaste or baby food," Dr. Levy stated.

Fluorosis is a cosmetic defect that occurs when more than an optimal amount of fluoride is ingested. The result of mild fluorosis is light spots on permanent teeth that develop while the teeth are still forming.

The researchers analyzed the fluoride concentration of 238 commercially available infant foods. They took samples for analysis from 206 ready-to-eat infant foods and 32 dry infant cereals, which they prepared with water according to the manufacturer's directions.

The results of the analysis reveal ready-to-eat foods with chicken had the highest fluoride concentrations.

One of the reasons for the high fluoride concentrations in infant foods with chicken may be because of the processing method, according to the study. The mechanical deboning process may leave skin and residual bone particles in the food. Much of fluoride is stored in bone; therefore, the higher concentrations in the chicken-containing products.

The researchers also found that dry infant cereals that are reconstituted with fluoridated water may noticeably increase the levels of fluoride in a child's daily intake.

"What we found in this study is fluoride concentrations for the majority of all the products tested varied widely because of the different water sources used to process the foods," Dr. Levy explains. "The differences can be traced to the manufacturing sites that use a fluoridated municipal water supply as compared to a non-fluoridated city or well water."

The American Dental Association reminds consumers that drinking water fluoridated at the recommended level or eating foods prepared or processed with fluoridated water is safe and effective.

Fluoride and the Phosphate Connection

by George C. Glasser

Cities all over the US purchase hundreds of thousands of gallons of fresh pollution concentrate from Florida – fluorosilicic acid (H_2SiF_6) – to fluoridate water.

Fluorosilicic acid is composed of tetrafluorosiliciate gas and other species of fluorine gases captured in pollution scrubbers and concentrated into a 23% solution during wet process phosphate fertilizer manufacture. Generally, the acid is stored in outdoor cooling ponds before being shipped to US cities to artificially fluoridate drinking water.

Fluoridating drinking water with recovered pollution is a cost-effective means of disposing of toxic waste. The fluorosilicic acid would otherwise be classified as a hazardous toxic waste on the Superfund Priorities List of toxic substances that pose the most significant risk to human health and the greatest potential liability for manufacturers.

Phosphate fertilizer suppliers have more than $10 billion invested in production and mining facilities in Florida. Phosphate fertilizer production accounts for $800 million in wages per year. Florida's mines produce 30% of the world supply and 75% of the US supply of phosphate fertilizers. Much of the country's supply of fluoro-silicic acid for water fluoridation is also produced in Florida.

Phosphate fertilizer manufacturing and mining are not environment friendly operations. Fluorides and radionuclides are the primary toxic pollutants from the manufacture of phosphate fertilizer in Central Florida. People living near the fertilizer plants and mines, experience lung cancer and leukemia rates that are double the state average. Much of West Central Florida has become a toxic waste dump for phosphate fertilizer manufacturers. Federal and state pollution regulations have been modified to accommodate phosphate fertilizer production and use: These regulations have included using recovered pollution for water fluoridation.

Radium wastes from filtration systems at phosphate fertilizer facilities are among the most radioactive types of naturally occurring radioactive material (NORM) wastes. The radium wastes are so concentrated, they cannot be disposed of at the one US landfill licensed to accept NORM wastes, so manufacturers dump the radioactive wastes in acidic ponds atop 200-foot-high gypsum stacks. The federal government has no rules for its disposal.

During the late 1960's, fluorine emissions were damaging crops, killing fish and causing crippling skeletal fluorosis in livestock. The EPA became concerned and enforced regulations requiring manufacturers to install pollution scrubbers. At that time, the facilities were dumping the concentrated pollution directly into waterways leading into Tampa Bay.

George Glasser is a Florida-based writer whose work has appeared in Newlife, Whole Life Times, *the* Sarasota ECO Report *and the* Tampa Tribune.

A Phosphate Worse than Death

In the late 1960's, EPA chemist Ervin Bellack worked out the ideal solution to a monumental pollution problem. Because recovered phosphate fertilizer manufacturing waste contain about 19% fluorine, Bellack concluded that the concentrated "scrubber liquor" could be a perfect water fluoridation agent. It was a liquid and easily soluble in water, unlike sodium fluoride – a waste product from aluminum manufacturing. It was also inexpensive.

Fate also intervened. The aluminum industry, which previously supplied sodium fluoride for water fluoridation, was facing a shortage of fluorspar used in smelting aluminum. Consequently, there was a shortage of sodium fluoride to fluoridate drinking water.

For the phosphate fertilizer industry, the shortage of sodium fluoride was the key to turning red ink into black and an environmental liability into a perceived asset. With the help of the EPA, fluorosilicic acid was transformed from a concentrated toxic waste and a liability into a "proven cavity fighter."

The EPA and the US Public Health Service waived all testing procedures and — with the help of the American Dental Association (ADA) — encouraged cities to add the radioactive concentrate into America's drinking water as an "improved" form of fluoride.

In promoting the use of pollution concentrate as a fluoridation agent, the ADA, Federal agencies and manufacturers failed to mention that it was radioactive.

The product is not "fluorine" or "fluoride" as proponents state: It is a pollution concentrate. Fluorine is only one captured pollutant comprising about 19% of the total product.

By 1983, the official EPA policy was expressed by EPA Office of Water Deputy Administrator Rebecca Hanmer as follows: *"In regard to the use of fluosilicic (fluorosilicic) acid as a source of fluoride for fluoridation, this agency regards such use as an ideal environmental solution to a long-standing problem. By recovering by-product fluosilicic acid from fertilizer manufacturing, water and air pollution are minimized, and water utilities have a low-cost source of fluoride available to them."*

A Hot New Property

In promoting the use of the pollution concentrate as a fluoridation agent, the ADA, Federal agencies and manufacturers failed to mention that it was radioactive. Whenever uranium is found in nature as a component of a mineral, a host of other radionuclides are always found in the mineral in various stages of decay. Uranium and all of its decay-rate products are found in phosphate rock, fluorosilicic acid and phosphate fertilizer.

During wet-process manufacturing, trace amounts of radium and uranium are captured in the pollution scrubber. This process was the subject of an article by H.F. Denzinger, H. J. König and G.E. Krüger in the fertilizer industry journal, *Phosphorus & Potassium* (No. 103, Sept./Oct. 1979) discussed how radionuclides are carried into the fluorosilicic acid.

While the uranium and radium in fluorosilicic acid are known carcinogens, two decay products of uranium are even more carcinogenic: radon-222 and polonium-210.

During the acidulation process that creates phosphoric acid, radon gas contained in the phosphate pebble can be released in greater proportions than other decay-rate products (radionuclides) and carried over into the fluorosilicic acid. Polonium may also be captured in greater quantities during scrubbing operations because, like radon, it can readily combine with fluoride.

In written communications to the author, EPA Office of Drinking Water official Joseph A. Cotruvo and Public Health Service fluoridation engineer Thomas Reeves have acknowledged the presence of radionuclides in fluorosilicic acid.

Radon-222 is not an immediate threat because it stops emitting alpha radiation and decays into lead-214 in 3.86 days. Lead-214 appears to be harmless but it eventually decays into bismuth-214 and then into polonium-214. Unless someone knew to look for specific isotopes, no one would know that a transmutation into the polonium isotope had occurred.

Polonium-210, a decay product of bismuth-210, has a half-life of 138 days and gives off intense alpha radiation as it decays into regular lead and becomes stable. Any polonium-210 that might be present in the phosphate concentrate could pose a significant health threat. A very small amount of polonium-210 can be very dangerous, giving off 5,000 times more alpha radiation than the same amount of radium. As little as 0.03 microcuries (6.8 trillionths of a gram) of polonium-210 can be carcinogenic to humans.

The lead isotope behaves like calcium in the body. It may be stored in the bones for years before turning into polonium-210 and triggering a carcinogenic release of alpha radiation.

Drinking water fluoridated with fluorosilicic acid contains radon at every sequence of its decay to polonium. The fresher the pollution concentrate, the more polonium it will contain.

As long as the amount of contaminants added to the drinking water (including radionuclides in fluorosilicic acid) do not exceed the limits set forth in the Safe Drinking Water Act, the EPA has no regulatory problem with the use of any contaminated products for drinking water treatment.

Big Risks: No Tests.

Despite the increased cancer risk from using phosphate waste to fluoridate drinking water, the EPA nor the Centers for Disease Control have never commissioned or required any clinical studies with the pollution concentrate – specifically, the hexafluorsilicate radical whose toxicokinetic properties are different than the lone, fluoride ion.

Section 104 (I) (5) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) directs the Toxic Substances and Disease Registry, the EPA, the Public Health Service and the National Toxicology Program to initiate a program of research on fluoride safety. However, after almost 30 years of using fluorosilicic acid and sodium fluorosilicate to fluoridate the drinking water, not one study has been commissioned.

The fluoride ion only hypothetically exists as an entity in an ideal solution of purified water – and tap water is far from pure H_2O. All clinical research with animal models is done using 99.97% pure sodium fluoride and double distilled or deionized water. Among the thousands of clinical studies about fluoride, not one has been done with the pollution concentrate or typical tap water containing fluorides.

Synergy Soup

The fluorosilicic acid is also contaminated with small traces of arsenic, cadmium, mercury, lead, sulfates, iron and phosphorous, not to mention radionuclides. Some contaminants have the potential to react with the hexafluorosilicate radical and may act as complex ionic compounds. The biological fates and toxicokinetic properties of these complex ions are unknown.

The reality of artificial water fluoridation is so complex that determining the safety of the practice may be impossible. Tap water is chemically treated with chlorine, soluble silicates, phosphate polymers and many other chemicals. In addition, the source water itself may contain a variety of contaminants.

The addition of a fluoridation agent can create synergized toxicants in a water supply that have unique toxico-kinetic properties found only in that particular water supply. Consequently, any maladies resulting from chronic ingestion of the product likely would be dismissed as a local or regional anomaly unrelated to water fluoridation.

> ***"By recovering by-product fluosilicic acid from fertilizer manufacturing... water utilities have a low-cost source of fluoride available to them."***
> **Rebecca Hammer, Office of Water, EPA, 1983**

Technically, artificially fluoridating drinking water is a violation of the Safe Drinking Water Act (SDWA). Under statutes of the SDWA, federal agencies are forbidden from endorsing, supporting, requiring or funding the practice of adding any chemicals to the water supply other than for purposes of water purification. However, the Public Health Service (PHS) applies semantics to circumvent Federal law in order to promote and fund the practice.

PHS states that they only recommend levels of fluorides in the drinking water, and it is the sole decision of a state or community to fluoridate drinking water.

Federal agencies are forbidden from directly funding or implementing water fluoridation but Federal Block Grants are given to States to use as they see fit. Through second and third parties (such as the American Dental Association, state health departments and state fluoridation coordinators), PHS encourages communities to apply for Federal Block Grant funds to implement fluoridation.

The legality of using of Federal Block Grant funds to fund water fluoridation, a practice prohibited by Federal law, has never been addressed in the courts.

Vendors selling the pollution concentrate as a fluoridation agent use a broad disclaimer found on the Material Data Safety Sheet that states: "no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from *any hazards inherent to the product.*" [*Emphasis added.*]

The next time you turn on the tap and water gushes out into a glass, reflect on the following disclaimer from the EPA's 1997 Fluoride: Regulatory Fact Sheet:

"In the United States, there are no Federal safety standards which are applicable to additives, including those for use in fluoridating drinking water."

{CITATIONS AVAILABLE ON REQUEST}

Resources

Organizations

Center for Health Action
PO Box 80270, Forest Park Station
Springfield, MA 01138

Citizens for Safe Drinking Water
3243 Madrid Street
San Diego, CA 92110

Concerned Citizens for Pure Water
164 Heatherly Heights Road
Saluda, NC 28773

Fluoride Alert
192 Locha Trail
Jupiter, FL 33458

Global Alliance Against Fluoridation
Park West Station, PO Box 20832
New York, NY 10025-1516

Health Alliance International
645 Ninth Street
Oakmont, PA 15139

New Jersey Citizens Opposing Forced Fluoridation, Inc.
PO Box 4315
River Edge, NJ 07661

New York State Coalition Opposed to Fluoridation, Inc.
PO Box 263
Old Bethpage, NY 11804-0263

Our Rights Our Water
1102 Pleasant Street, #818
Worcester, MA 01602

Pure Water Committee of Western Maryland
2245 Pocahontas Road
Frostburg, MD 21532

Safe Water Association, Inc.
PO Box 502
Fond du Lac, WI 54936

Safe Water Coalition, Inc.
PO Box 6134
Albany, CA 94706

Safe Water Coalition, Inc.
PO Box 773
Orinda, CA 94563-0768

Safe Water Coalition of Washington State
5615 West Lyons Court
Spokane, WA 99208

Safe Water Committee
PO Box 1242
Old Chelsea Station
New York, NY 10113

Safe Water Foundation of Texas
11419 Shadow Way
Houston, TX 77024

Tacoma Fluoride Alert
1507 North Fife Street
Tacoma, WA 98406

Waste Not
82 Judson Street
Canton, NY 13617

Books

Continuing Evaluation of the Use of Fluorides, ed. Erling Johansen, Donald Taves and Thor Olsen. (Westview Press for the American Association for the Advancement of Science, 1979)

Fluoridation: The Great Dilemma by Albert W. Burgstahler, H. Lewis McKinney and George L. Walbott (Coronado Press Inc., 1978)

Fluoride, the Aging Factor: How to Recognize and Avoid the Devastating Effects of Fluoride by Dr. John Yiamouyiannis (1993)

Fluoride Emissions: Their Monitoring and Effects on Vegetation and Ecosystems by Frank Murray (1982)

Review of Fluoride: Benefits and Risks. Report of the Ad Hoc Subcommittee on Fluoride, US Department of Health and Human Services (February 1991)

The Fluoride Question: Panacea or Poison by Anne-Lise Gotzsche (Stein and Day, 1975)

Publications

"Fluoride's Revenge," by Daniel Grossman (*The Progressive*, December 1990)

Environmental Fluoride 1977, National Ressearch Council of Canada

"Fluoridation of Public Water Systems: Valid Exercise of State Police Power or Constitutional Violation?" by Douglas A. Balog. *Pace Environmental Law Review*, 1997

"Fluoride: Industry's Toxic Coup," by Joel Griffiths (*Covert Action Quarterly*, Fall 1992; *Earth Island Journal*, Fall 1998)

"Fluoride Pollution," by Edward Groth III (*Environment*, April/May 1975)

Fluorides and Oral Health, World Heath Organization, Technical Series No. 846 (1994)

Fluorides. Committee on Biologic Effects of Atmospheric Pollutants, National Research Council, National Academy of Sciences (1971)

Fluoride, the quarterly journal of the International Society for Fluoride Research, 81A Landscape Road, Mt. Eden, Auckland 4, New Zealand, phone/fax: 011-11-64-9-630-7114.

Health Effects of Ingested Fluoride, National Academy of Sciences/National Research Council, 1993

"Special Investigative Report on Fluoridation," *Chemical & Engineering News*, August 1, 1988.

"The Fluoride Connection," by Richard G. Foulkes, MD, *Townsend Letter* (April 1998)

Websites

American Dental Association Fluoridation Facts
(Source for pro-fluoride information)
http://www.ada.org/consumer/fluoride/facts

Academy of General Dentistry
http://www.agd.org

American Dietetic Association
http://www.dentnet.nl/ntvt

Canadian Pediatric Society
http://www.cps.ca

Dental Fluorosis Prevention Program
http://www.inter-view.net/~sherrell

Fluoride Issues
http://www.sonic.net/~kryptox

Health Action Network Society, Alberta, Canada
http://www.cadvision.com/fluoride

Holistic Dental Association, Holistic/Alternative Dentistry
http://www.simwell.com/hda

Leading Edge International Research Group
http://www.trufax.org

Preventative Dental Health Association
http://emporium.turnpike.net/P/PDHA/

The Fluoride Stop
http://bruha.com/fluoride

Stop Fluoridation USA
http://home.cdsnet.net/~fluoride

Zero Waste America
http://www.zerowasteamerica.com/BanFluoride.htm

Fluoride-free Toothpaste

Baby Orageł Tooth & Gum Cleanser, Del Pharmaceuticals

First Teeth Toothpaste for Babies & Toddlers, Nu-Tec Health Products, Inc. Carlsbad, CA 92008

Homoedent (France), Distributed by Boiron-Borneman, Inc., Newton Square, PA 19073

Nature's Gate, Levlad, Inc., Chatsworth, California 91311

Natural Tea Tree Oil, Desert Essence, Chatsworth, CA 91311

Optifresh; Tea Tree, Distributed by Natural Organics, Inc., 548 Broadhollow Rd., Melville, NY 11747

Peelu Toothpaste, Distributed by The Peelu Co., Box 2672, Fargo, ND 58108, 1 (800) 457-3358

The Natural Dentist, Woodstock Natural Products, Inc., 2337 Lemoine Ave., Fort Lee, NJ 07024, (800) 615-6895

Tru-Dent, Schiff Products, Inc., Salt Lake City, UT 84194

Vademecum Toothpaste, The Swedish Whitener
Distributed in the US by Dermatone Lab, Connecticut

Weleda Toothpaste, Weleda, Inc., PO Box 249, Congers, NY 10920, (800) 289-1969

"Our members' review of the body of evidence over the last 11 years, including animal and human epidemiology studies, indicates a causal link between fluoride/fluoridation and cancer, genetic damage, neurological impairment and bone pathology... the health and welfare of the public is not served by the addition of this substance (fluoride) to the public water supply... for which there is virtually no evidence of significant benefits... and substantial evidence of harm." — *National Federation of Federal Employees Union (Local 2050), Washington, DC, July 1997*