

## The Environmental Critique of Water Fluoridation

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Résumé de l'article

Alors que les gens associent souvent l'opposition à la fluoration de l'eau de la communauté avec l'extrême droite, la plupart des gens opposés à la fluoration étaient préoccupés par l'impact que cela pourrait avoir sur la santé et l'environnement. Dans les années 1960 et 1970, les opposants à la fluoration évoquaient fréquemment la possibilité que le fluore s'accumulerait dans le corps humain et dans l'environnement, conduisant à des problèmes de santé à long terme. Ils étaient assistés par une nouvelle génération de scientifiques, intéressés en toxicologie et en santé environnementale, qui commencèrent à publier des articles critiques de la fluoration de l'eau. Dans les années 1970, la critique de la fluoration de l'eau était d'avoir un impact significatif sur l'environnement. Par exemple, à la fin des années 1970, la loi exigeant la fluoration de l'eau obligatoire au Québec a été suspendue, en grande partie en raison de préoccupations environnementales. Le débat sur la fluoration de l'eau est juste un exemple de la façon dont les Canadiens sont devenus plus préoccupés par la relation entre l'environnement et la santé humaine dans la seconde moitié du XXe siècle.

# The Environmental Critique of Water Fluoridation<sup>1</sup>

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**Abstract :** While people often associate the opposition to community water fluoridation with the extreme right, most people opposed to fluoridation were concerned about the impact that it might have on health and the environment. In the 1960s and 1970s, anti-fluoridationists frequently mentioned the possibility that fluoride would accumulate in our bodies and in our environment, leading to long-term health problems. They were assisted by a new generation of scientists, interested in toxicology and environmental health, who began publishing articles critical of water fluoridation. By the 1970s, the environmental critique of water fluoridation was having a significant impact. For example, in the late 1970s, the legislation mandating compulsory water fluoridation in Quebec was suspended, largely because of environmental concerns. The debate over water fluoridation is just one example of how Canadians became more concerned about the relationship between the environment and human health in the second half of the twentieth century.

**Résumé :** Alors que les gens associent souvent l'opposition à la fluoration de l'eau de la communauté avec l'extrême droite, la plupart des gens opposés à la fluoration étaient préoccupés par l'impact que cela pourrait avoir sur la santé et l'environnement. Dans les années 1960 et 1970, les opposants à la fluoration évoquèrent fréquemment la possibilité que le fluore s'accumulerait dans le corps humain et dans l'environnement, conduisant à des problèmes de santé à long terme. Ils étaient assistés par une nouvelle génération de scientifiques, intéressés en toxicologie et en santé environnementale, qui commencèrent à publier des articles critiques de la fluoration de l'eau. Dans les années 1970, la critique de la fluoration de l'eau était d'avoir un impact significatif sur l'environnement. Par exemple, à la fin des années 1970, la loi exigeant la fluoration de l'eau obligatoire au Québec a été suspendue, en grande partie en raison de préoccupations

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environnementales. Le débat sur la fluoration de l'eau est juste un exemple de la façon dont les Canadiens sont devenus plus préoccupés par la relation entre l'environnement et la santé humaine dans la seconde moitié du XXe siècle.

In the early 1950s, a number of studies showed that adding small amounts of fluoride to municipal water supplies could make dramatic improvements in children's dental health. As a result, cities across North America (as well as some in Britain, Australia, and Europe) began debating whether or not to add fluorides to their water supply. The debate, as numerous historians have shown, quickly became extremely heated.<sup>2</sup> While contemporary supporters of water fluoridation often characterized their opponents as crazed anti-Communists who were worried that fluoride might be used for mass sabotage, historians have shown that most anti-fluoride activists were concerned that fluoride might have harmful

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<sup>2</sup> The US literature on the history of water fluoridation includes: Gregory Field, "Flushing Poisons from the Body Politic: The Fluoride Controversy and American Political Culture, 1955-65" in *The Sixties Revisited: Culture-Society-Politics*, eds. Jurgen Heideking, Jord Helbig and Anke Ortlepp (Heidelberg: Universitätsverlag, 2001), 469-485; Gretchen Reilly, "The Task is a Political One: The Promotion of Fluoridation" in *Silent Victories: The History and Practice of Public Health in Twentieth Century America*, eds. John W. Ward and Christian Warren (Oxford: Oxford University Press, 2007), 323-342; Gretchen Reilly, "'Not a So-Called Democracy': Anti-fluoridationists and the Fight over Drinking Water" in *The Politics of Healing: Histories of Alternative Medicine in Twentieth-Century North America*, ed. Robert D. Johnson (New York and London: Routledge, 2004), 131-150; Gretchen Reilly, "'This Poisoning of Our Drinking Water': The American Fluoridation Controversy in Historical Context, 1950-1990," (PhD Dissertation, George Washington University, 2001); Brian Martin, *Scientific Knowledge in Controversy: The Social Dynamics of the Fluoridation Debate* (Albany: State University of New York Press, 1991); Christopher Sellers, "The Artificial Nature of Fluoridated Water: Between Nations, Knowledge and Material Flows," *Osiris* 19 (2004): 182-200. The Canadian literature includes: Catherine Carstairs and Rachel Elder, "Expertise, ALCO Health and Popular Opinion: Debating Water Fluoridation, 1945-80," *Canadian Historical Review* 89, 3 (September 2008): 345-371; Catherine Carstairs, "Cities without Cavities: Democracy, Risk and Public Health," *Journal of Canadian Studies* 44, 2 (2010): 146-70. I've also published on the early scientific debates over water fluoridation. See: Catherine Carstairs, "Debating Water Fluoridation before Dr. Strangelove," *American Journal of Public Health* (forthcoming.) There is also an emerging literature on water fluoridation in Australia, New Zealand and Britain. See: Jill Wrapson, "Artificial Fluoridation of Public Water Supplies in New Zealand: 'Magic Bullet', Rat Poison or Communist Plot," *Health & History: Journal of the Australian and New Zealand Society for the History of Medicine* 7, 2 (2005): 17-29; Harry Akers, Suzette Porter and Rae Wear, "Water Fluoridation in Queensland, Why Not? Timing, Circumstance and the Nature of 'The Fluoridation of Public Water Supplies Act (1963)'," *Health and History: Journal of the Australian and New Zealand Society for the History of Medicine* 7, 2 (2005): 30-55; Amy Whipple, "'Into Every Home, Into Every Body' Organicism and Anti-Statism in the British Anti-Fluoridation Movement, 1952-1960," *Twentieth Century British History* 21, 3 (2010): 330-49.

effects on health. Others thought forcing them to consume a substance through the public water supply was a violation of civil liberties. Some believed it was a waste of public funds. As this paper will illustrate in detail, a significant number of anti-fluoride activists in Canada were also worried about food additives and pesticide use, and opposed fluoride because they believed fluoride could damage the environment and our health. By the 1960s and 1970s, anti-fluoridationists frequently mentioned the possibility that fluoride would accumulate in our bodies and in our environment, leading to long-term health problems. They were assisted by a new generation of scientists, interested in toxicology and environmental health, who began publishing articles critical of water fluoridation in environmental science and nutrition journals. By the 1970s, this critique resonated with Canadians, who were increasingly conscious of pollutants in our water, air and soil, becoming more skeptical of the ability of experts including doctors and scientists to keep us safe from harm and more fearful about the long-term health effects of the man-made chemicals that surrounded us.<sup>3</sup> The opposition to water fluoridation is just one example of how Canadians become more concerned about ecology, and especially about the relationship between the environment and human health, in second half of the twentieth century.

The fluoride debate was always a cross-border affair: Canadian dentists and public health officials paid careful attention to the studies that were being done in the United States, while American researchers were aware of the work being completed in Canada. Similarly, anti-fluoride material flowed across the border: anti-fluoridationists in Canada relied heavily on US publications. When Canadian scientists played a key role in developing the environmental critique of water fluoridation, their research was widely disseminated by anti-fluoridationists in the US. As a result, the debates were very similar on both sides of the border. This paper will focus on the Canadian side of the debate but it will also describe the US material that informed the Canadian debate. There was, of course, fluoride research and fluoride debates taking place outside of North America, but this paper will focus on the debates as they played out in Canada, which primarily drew on information from North America. It will focus on the

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<sup>3</sup> The growing literature on the ecology movement in Canada includes: Joy Parr, *Sensing Changes: Technologies, Environments and the Everyday, 1953-2003* (Vancouver: University of British Columbia Press, 2010); Ryan O'Connor, *The First Green Wave: Pollution Probe and the Origins of Environmental Activism in Ontario* (Vancouver: UBC Press, 2015); Jennifer Read, "Let us Head the Voice of Youth': Laundry Detergents, Phosphates and the Emergence of the Environmental Movement in Ontario," *Journal of the Canadian Historical Association* 7 (1996): 227-50; Arn Keeling, "Urban Waste Sinks as a Natural Resource: The Case of the Fraser River," *Urban History Review/Revue d'Histoire Urbaine* 34, 1 (2005): 58-70.

environmental dimensions of these debates, as Rachel Elder and I have explored other reasons for opposition to fluoride in articles published elsewhere.<sup>4</sup>

### **The Fluoride Debate: The Early Years**

From the very beginning, Canadian anti-fluoridationists, who often belonged to organizations concerned about the growing use of pesticides and food additives, drew attention to the corporate interests behind water fluoridation, and to the problem of airborne fluoride pollution. As Amy Whipple and Gregory Field have argued for Britain and the United States respectively, opposition to water fluoridation was part of a larger “green” or organicist movement.<sup>5</sup> For example, in 1955, Lydia Arsens, a Social Credit MLA in British Columbia, condemned water fluoridation in the legislature: “Sodium fluoride...is a highly toxic substance which is a by-product of the manufacture of Aluminum. It is a commonly used insecticide and vermin exterminator.” Holding up a container of sodium fluoride purchased from a drug store, she noted the “POISON” label. The real cause of tooth decay, she asserted, was “our refined foods, our chemically bleached flour, our white sugar, candies” and “soft drinks.” Her speech was circulated in pamphlet form by the Pure Food Guild (started by health food store owner, Edward Moxey), which was the most prominent group opposing fluoridation in Vancouver. The speech also referred to an Oregon rancher who had recently filed suit for more than \$200,000 against the Vancouver Washington plant of the Aluminum Company of America. Two years previously, the courts had awarded him \$60,000 because the company was dumping between 1000-7000 pounds of fluorides each month into the Columbia River, causing damage to grass and forage and killing some of his cattle.<sup>6</sup>

Indeed, at the same time that North American research showed that fluorides might have a beneficial impact on dental health, other fluoride research emphasized the danger fluorides posed to human health in industrial settings. Fluorides, especially those released as part of aluminum, steel and fertilizer manufacturing were long known to have a deleterious impact on plant and animal life. In the 1930s, the world’s leading expert on fluoride and human health was Kaj Roholm, an Assistant Physician with the Inspectorate of Factories and Workshops in Copenhagen. His studies of cryolite, a rare mineral used in glass and

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<sup>4</sup> Carstairs and Elder, “Expertise, Health and Popular Opinion”; Carstairs, “Cities Without Cavities.”

<sup>5</sup> Whipple, “‘Into Every Home’”; Field, “Flushing Poisons from the Body Politic.”

<sup>6</sup> “Except on ‘Fluoridation of Water’ taken from a Speech made by Mrs. Lydia Arsens MLA in BC Legislature February 22, 1955” reprinted by the Pure Food Guild of BC. File 1, Box 35-E-4, Series S483, Vancouver City Archives.

aluminum production, which contains large amount of fluoride, found that workers had digestive problems as well as severe osteosclerosis.<sup>7</sup> In a subsequent publication, Roholm argued that the Meuse fog, which descended on the Meuse Valley of Belgian and killed sixty people in 1930, was caused by fluoride.<sup>8</sup>

Fluoride would be implicated in other air pollution disasters as well. In the fall of 1948, a heavy fog covered much of the Northeastern US, especially the city of Donora, approximately 30 miles south of Pittsburgh. The fog led to widespread respiratory illness and the death rate for the city temporarily spiked. A US Public Health Service study suggested that sulfur dioxide, its oxidation products and non-specific particulate matter, were to blame for the illness and deaths. But at least one study suggested that fluorides might be the cause.<sup>9</sup> Scientists also recognized the damage that airborne fluorides did to surrounding crops and especially to the animals that grazed upon them.<sup>10</sup> In the 1940s and 50s, as the number of industries using fluorinated chemicals increased, there were a growing number of reports of fluorosis (a chronic disease caused by excessive fluoride consumption) among sheep, cattle and other animals.<sup>11</sup> Researchers also worried about the impact of pesticides containing fluorides, which had come into use in the 1930s, on human health.<sup>12</sup> But this literature had little impact on the water fluoridation debate: the doctors and dentists who promoted fluoride relied on studies done by the US Public Health Service in the 1930s, 40s and 50s to argue that fluoride had been proven to be safe.<sup>13</sup> And, for the most part, anti-fluoridationists

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<sup>7</sup> Kaj Roholm, *Fluorine Intoxication* (Copenhagen: NYT Nordisk Forlag, 1937), 138 and 144. Frank McClure, *The Search and the Victory*, 47-52.

<sup>8</sup> Kaj Roholm, "The Fog Disaster in the Meuse Valley 1930: A Fluorine Intoxication," *Journal of Industrial Hygiene and Toxicology* 19 (1937): 126-137.

<sup>9</sup> Harry Heinman, "Effects of Air Pollution on Health" in World Health Organization ed. *Air Pollution* (Geneva: World Health Organization, 1961), 159-220.

<sup>10</sup> D.R. Adamas, J.W. Hendrix and HG Applegate "Atmospheric Pollution, Relationships among Exposure Periods, Foliar Burn, and Fluorine Content of Plants Exposed to Hydrogen Fluoride," *Journal of Agricultural and Food Chemistry* 5, 2 (1957), 108-116; A.G. Hill, L.G. Transtrum, M.R. Pack and W.S. Winters "Air Pollution with Relation to Agronomic Crops VI: An Investigation of the 'Hidden Injury' of Fluoride Damage to Plants," *Agronomy Journal* 50, 9 (1958): 562-5.

<sup>11</sup> Leonard Weinstein and Alan Davidson, *Fluorides in the Environment: Effects on Plants and Animals* (Oxon, UK: CABI Publishing, 2004), 71-2.

<sup>12</sup> Fluorinated pesticides first came on the market in 1933. James Whorton, *Before Silent Spring: Pesticides and Public Health in Pre-DDT America* (Princeton: Princeton University Press, 1974), 214. W.B. White, "Poisonous Spray Residues on Vegetables" *Industrial and Engineering Chemistry* 25, 6 (June 1933), 621-3.

<sup>13</sup> Many of these studies were compiled in: Forest Ray Moulton, ed., *Dental Caries and Fluorine* (Washington: American Association for the Advancement of Science, 1946).

in Canada argued that fluoridation was a violation of civil liberties, that there were better ways of diminishing tooth decay, and that some people might suffer health problems through consuming fluoride.

Most Canadians were likely unaware of the industrial hazards of fluorides but a small number of ecologically-minded citizens were beginning to pay attention to the environmental movement that was emerging south of the border.<sup>14</sup> The publication of science journalist Rachel Carson's *Silent Spring* (1962) marked a turning point in the development of the modern North American environmental movement but even before that, as numerous environmental historians have shown, there was a growing number of people in the US in the 1940s and 50s who were critical of excessive pesticide use, disturbed by the growing problem of industrial pollution and cognizant of the connections between the environment and health.<sup>15</sup> One of the first American books to draw attention to the problem of fluoride pollution was Leonard Wickenden's *Our Daily Poison: The Effects of DDT, Fluorides, Hormones and Other Poisons on Modern Man* (1955). Wickenden, the author of the organic-gardening books *Make Friends with Your Land* (1949), and *Gardening with Nature* (1954) was a chemist by training.<sup>16</sup> *Our Daily Poison* drew on the hearings of the US House Select Committee to Investigate the Use of Chemicals in Food and Cosmetics (the Delaney Committee), which had met in 1950-52 to determine the impact of growing chemical use on the health and welfare of the United States. As part of their investigation, they produced a separate report on water fluoridation that concluded that too much was unknown about the long-term safety of fluoridation and cautioned that too many chemicals were being added to the food and water supply.<sup>17</sup> Wickenden argued that the benefits of fluoride were less than they appeared to be and that the possibility of harm was much

<sup>14</sup> O'Connor has argued that the environmental movement in Canada started much later than the American movement. See O'Connor, *The First Green Wave*, 3.

<sup>15</sup> Robert Gottlieb, *Forcing the Spring: The Transformation of the American Environmental Movement* (Washington DC: Island Press, 1993); Donald Worster, *Nature's Economy: A History of Ecological Ideas* (Cambridge: Cambridge University Press, 1994); Samuel Hays, *Beauty, Health and Permanence: Environmental Politics in the United States, 1955-1985* (Cambridge: Cambridge University Press, 1987); Linda Nash, *Inescapable Ecologies. A History of Environment, Disease and Knowledge* (Berkeley: University of California Press, 2006); Fairfield Osborn, *Our Plundered Planet* (Boston: Little, Brown and Company, 1948).

<sup>16</sup> Leonard Wickenden, *Making Friends with Your Land: A Chemist Looks at Organic Culture* (New York: Devin-Adair, 1949); Leonard Wickenden, *Gardening with Nature: How to Grow your Own Vegetables, Fruits and Flowers through Organic Methods* (New York: Devin-Adair, 1954).

<sup>17</sup> US Congress, House Committee to Investigate the Use of Chemicals in Foods and Cosmetics, *Report Pursuant to H. Res 74 82d Cong, 1<sup>st</sup> Session, Fluoridation of Public Drinking Water* (Washington, 1952).

greater. He warned that something perfidious was going on behind the scenes in the fluoride debate: prominent scientists were being abused and the report of the Delaney committee on fluoridation was being ignored. He noted that most of the fluorides being produced for water fluoridation were being produced by the aluminum and chemical fertilizer industry.<sup>18</sup>

Wickenden's critique of fluoride was part of a much larger and more sustained argument against changes that were taking place in agriculture and food production. Wickenden argued that the use of DDT had led to a hepatitis epidemic in the US and that the more DDT and other chemicals were used, the more pests proliferated. Another chapter condemned the dangers in cosmetics including permanent hair dyes, lacquer pads and hormones in face creams. He criticized the use of stilbestrol (DES) in the poultry industry, condemned the milling of bread and urged people to begin growing their own organic vegetables.<sup>19</sup> Indeed, as Wickenden's critique suggests, there were close links between the growing health food movement and anti-fluoridation agitation. Anti-fluoridation campaigns were often led by health food storeowners in both the US and Canada and American health food magazines such as *Let's Live* and *Natural Food and Farming* frequently ran anti-fluoridation articles in the 1950s.<sup>20</sup>

Another ecologically-minded fluoride opponent in the United States was Jonathan Forman, who, as an allergist was conscious of the impact of the environment on health.<sup>21</sup> Forman wrote a much-circulated piece of anti-fluoridation literature for *The Land* in 1953. *The Land* was the newsletter of Friends of the Land, a prominent ecology group supported by early American environmentalists such as Paul Sears and Aldo Leopold. Historian Randal Beeman argues that the Friends of the Land shows that an ecological critique was developing as early as the 1930s and that agricultural reformers played a large role in developing and circulating these ideas.<sup>22</sup> Forman warned that: "Fluorine and its salts are strong poisons" and cautioned that fluorine compounds were being widely used in "dyes, plastics, pharmaceuticals, tanning agents, metal fluxes, fumigants, insecticides, fungicides, germicides, fire extinguishers,

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<sup>18</sup> Leonard Wickenden, *Our Daily Poison: The Effects of DDT, Fluorides, Hormones and Other Poisons on Modern Man* (New York: The Devin Adair Company, 1956). Book was first printed by Devin-Adair in 1955.

<sup>19</sup> Wickenden, *Our Daily Poison*.

<sup>20</sup> Max Ginns, "Figures Disprove Claim that Fluoridation Cuts Tooth Decay," *Let's Live* 24, 5 (May 1956), 3; James Rorty, "Fluorine - The Case Against," *Natural Food and Farming* 3, 1 (April 1956), np. Both in Cornell University Archives, Papers of Clive McCay, Box 14 File Beverages 1956.

<sup>21</sup> Gregory Mittman, *Breathing Space: How Allergies Shaped Our Lives and Landscapes* (New Haven: Yale University Press, 2007).

<sup>22</sup> Randal Beeman, "Friends of the Land and the Rise of Environmentalism, 1940-1954," *Journal of Agricultural and Environmental Ethics* 8, 1 (1995), 1-16.



solvents, fire-proofing compounds, and heat transfer media.” (Fluoride is the ionized version of fluorine, but fluorine is highly reactive, so it always exists in the form of fluoride. In the 1950s and 60s, commentators often used the term fluorine.) He argued that fluoride accumulated in bones, leading to hypercalcification and brittleness. He suggested that too much fluoride led to baldness in young men, dysmenorrhea in women as well as thyroid problems and liver damage.<sup>23</sup>

Dr. George Waldbott, who would emerge as the most influential fluoridation opponent, was also an allergist by training. Waldbott was born and trained in Germany, but moved to the United States shortly after completing his medical degree.<sup>24</sup> Initially, Waldbott focused his opposition to water fluoridation on the possibility of fluoride allergy or fluoride intolerance. He believed that some people were particularly sensitive to the effects of fluoride, and published work showing that fluoride-sensitive patients recovered rapidly when switched to a supply of distilled water. Their symptoms returned if they went back to drinking fluoridated water.<sup>25</sup> He believed that fluoride, even at the relatively low dose of 1 ppm might not be safe for everyone. In 1955, he and his wife started the *National Fluoridation News*, an anti-fluoridation periodical that was widely read by fluoridation opponents across North America. From the very beginning, *National Fluoridation News* also drew attention to incidents of air-borne fluoride damage. In 1955, for example, they cited a case in Oregon where the Martin family was awarded \$38,292 after claiming that they suffered fluorosis after eating vegetables from their property that were contaminated by fluoride fumes by the nearby Troutdale Aluminum Plant.<sup>26</sup> That said, most issues of the newspaper focused on errors in the pro-fluoridation research, reported on the harms caused by fluoride, emphasized that doctors and dentists who opposed fluoridation were being prevented from speaking out and followed fluoridation developments in the US and abroad.

In 1957, Waldbott and a fellow physician, Frederick Exner, a Seattle radiologist, published *The Fluoride Experiment*, the first book entirely devoted to making the case against water fluoridation. They each took responsibility for separate chapters, while the book was edited and given a powerful introduction by James Rorty who had published anti-fluoridation

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<sup>23</sup> Jonathan Forman, “Fluorine on Tap: The Case Against It,” *The Land* (Spring 1953), in University of Albany Archives, James Joseph Delaney Papers Folder 24, Box 1; Randal Beeman, *Ibid*.

<sup>24</sup> “George L. Waldbott Papers, 1930-1989,” <http://scua.library.umass.edu/umarmot/waldbott-george-l-1898>, accessed 20 May 2015.

<sup>25</sup> George Waldbott, “Incipient Fluorine Intoxication from Drinking Water,” *Acta Medica Scandinavica* 156, 3 (December 1956): 157-68.

<sup>26</sup> “Alcoa guilty of Damage to Family,” *National Fluoridation News*, Nov-Dec 1955, 2.

articles in *Harper's Magazine* and the *Freeman*. Rorty was a muckraking journalist with a strong interest in food and nutrition and a deep skepticism about big business.<sup>27</sup> Foreshadowing a more detailed environmental critique that would emerge in the 1960s, *The Fluoridation Experiment* argued that North Americans were consuming fluorides from a variety of different sources – water, food and air, and that there was a very real possibility of consuming too much fluoride. They pointed out that fluoride was listed as a poison under the Pure Food and Drug Act and that food processing multiplied the amount of fluoride in foods.<sup>28</sup> Exner revealed that the “countryside around aluminum and fertilizer plants is devastated by fluoride fumes to the extent that millions of damages have been paid.”<sup>29</sup> Exner also argued that Gerald Cox, the first person to suggest adding fluoride to water supplies in 1939, was then working for the Mellon Institute, a private research institute funded by the late Andrew Mellon, the founder of the Aluminum Corporation of America (ALCOA).<sup>30</sup> (Anti-fluoride campaigners frequently took note of this fact. They also pointed out that Oscar Ewing, who headed the Public Health Service as part of his responsibilities as Administrator of the Federal Security Agency had previously served as a counsel to ALCOA.)<sup>31</sup> In fact, there is little evidence that ALCOA or other aluminum companies promoted fluoridation or that they made much money from fluoride production.<sup>32</sup> *The Fluoridation Experiment* was widely available and it became an important source for many local anti-fluoridation campaigns. While Exner and Waldbott were Americans, they had an important impact on Canadian fluoridation debates as well. Both travelled frequently to Canada to speak to anti-fluoridation groups, and both submitted briefs to the Ontario Royal Commission on fluoridation.<sup>33</sup>

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<sup>27</sup> James Rorty, “The Truth about Fluoridation,” *The Freeman*, June 29, 1953, 697-700; James Rorty, “Go Slow on Fluoridation,” *Harper's Magazine*, February 1953, 66-70. One year earlier Rorty and physician Philip Norman had published *Tomorrow's Food* (New York: Devin Adair Company, 1956) arguing that the food processing industry was destroying the healthfulness of American foods.

<sup>28</sup> F.B. Exner and G.L. Waldbott, *The American Fluoridation Experiment* (New York: Devin-Adair, 1957), 20-1.

<sup>29</sup> *Ibid.*, 120.

<sup>30</sup> *Ibid.*, 121.

<sup>31</sup> William Guy Carr, *The Devil's Poison: The Truth about Fluorine* (Willowdale, ON: National Federation of Christian Laymen, c.1956) in City of Calgary Archives, Series IV, Board of Commissioners.

<sup>32</sup> Carstairs and Elder, “Expertise, Health, and Popular Opinion”, 365.

<sup>33</sup> Brief #2 and Brief #88, Royal Commission, Royal Commission Appointed to Inquire into and Report Upon the Fluoridation of Municipal Water Supplies, Archives of Ontario, RG 18-140, Container 3.

While fluoridationists delighted in pointing out that fluoridation was a convenient way for ALCOA to get rid of a toxic waste product and paid some attention to the problem of air-borne fluoride pollution, the potentially negative health effects of fluorides were the primary concern of anti-fluoridationists and their leaders in the 1950s and 1960s. Occasionally, the health effects were cast in ecological terms: there was an acknowledgement that water fluoridation would increase exposure to fluorides, and they often compared fluoridation to DDT and food additives. But more often, anti-fluoridationists argued that the fluoride would cause specific ailments such as heart, kidney or bone disease, without making mention of the accumulation of fluoride in the body. Instead, anti-fluoridationists argued that there were other, more natural ways of preventing tooth decay like eating fewer refined foods or forbidding children from eating candy or drinking soft drinks. When the Ontario Royal Commission on Fluoridation (1959-1961) solicited the opinion of members of the public, only six of the seventy-one briefs opposed to fluoridation mentioned that fluoride was a toxic waste product produced by the aluminum and fertilizer industries. Clarence Boyle, a frequent writer of anti-fluoridation letters to Toronto newspapers claimed, "Water fluoridation is a high pressure scheme to sell sodium fluoride and the machinery with which to use it....Sodium fluoride is a by-product of the aluminum, fertilizers, and steel industries. It is very difficult to dispose of because of its poisonous nature."<sup>34</sup> Only two briefs mentioned the environment. Agnes Smith of Ottawa cautioned, "We are already getting too many poisons in our foods in form of sprays on fruit, insecticides, and additives and preservatives."<sup>35</sup> Most people argued that fluoridation was forcing them to take a medicine against their will and that it would have harmful long-term effects on health: it would lead to severely stained and disfigured teeth, it would accumulate in and weaken the bones of the elderly, it would lead to digestive disorders, heart disease and disabled infants.

### **The Emergence of a Stronger Environmental Critique**

Environmental arguments against fluoride would begin to assume a more prominent role in anti-fluoridation debates in the 1960s, thanks in part to work being done by scientists John Marier, Dyson Rose and Marcel Boulet at the National Research Council of Canada. Their first

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<sup>34</sup> Brief #20, Royal Commission, Royal Commission Appointed to Inquire into and Report Upon the Fluoridation of Municipal Water Supplies, Archives of Ontario, RG 18-140, Container 3.

<sup>35</sup> Brief #52, Royal Commission Royal Commission Appointed to Inquire into and Report Upon the Fluoridation of Municipal Water Supplies, Archives of Ontario, RG 18-140, Container 3.

article, published in the *Archives of Environmental Health* in 1963, suggested that researchers should pay more attention to the effect of minerals such as magnesium and calcium, which could reduce the amount of fluoride accumulated in bone. They also expressed concern about the impact of dietary deficiencies on fluoride accumulation, and urged scientists to re-consider the possibility of adding fluoride to milk instead of water.<sup>36</sup> This article received widespread media attention when John Lears, the science editor of the high-brow American publication *Saturday Review*, used it as a centerpiece for his anti-fluoridation article in January 1964.<sup>37</sup> A 1966 article in the *Journal of Food Science* by Marier and Rose cautioned that the use of fluoridated water in food processing would increase the fluoride content of foods and vegetables. They noted that people drank widely varying amounts of liquids and that total fluoride consumption might vary considerably depending on whether or not they worked outside or suffered from polydipsia (excessive thirst).<sup>38</sup> In 1971, they authored a small booklet entitled *Environmental Fluoride* for the National Research Council (Canada) that reviewed the existing literature on fluoride, its presence in the environment, and its effects on animals and man. It concluded that: “Modern man is probably exposed to more environmental fluoride than was heretofore suspected and consideration must be given to the total ingestion from various sources” and emphasized that more research was needed on the symptoms of chronic fluoride intoxication.<sup>39</sup> A second report, six years later, significantly expanded this study, and argued that fluoride pollution was a serious environmental problem with possible implications for human health, and especially for people living in communities with artificial water fluoridation.<sup>40</sup>

In the meantime, the problem of fluoride pollution was beginning to attract media attention. A key moment in the development of the Canadian environmental movement was the airing of three documentaries produced for the CBC by producer Larry Gosnell. The first and most successful of these documentaries, *Air of Death*, focused on fluoride pollution. *Air of Death* was broadcast in a prime slot in a Sunday evening in October 1967. It attracted an audience of 1.5 million and received

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<sup>36</sup> J.R. Marier, Dyson Rose and Marcel Boulet, “Accumulation of skeletal fluoride and its implications,” *Archives of Environmental Health* 6 (1963): 664-671.

<sup>37</sup> John Lears, “Documenting the Case Against Fluoridation,” *Saturday Review*, January 4, 1964, 85-92.

<sup>38</sup> J.R. Marier and Dyson Rose, “The Fluoride Content of Some Foods and Beverages – a Brief Survey Using a Modified Zr-SPADNS Method,” *Journal of Food Science* 31 (1966): 941-6.

<sup>39</sup> J.R. Marier and Dyson Rose, *Environmental Fluoride* (Ottawa: National Research Council of Canada, 1971), 28.

<sup>40</sup> Dyson Rose and J. R. Marier, *Environmental Fluoride* (Ottawa: National Research Council of Canada, 1977).

enthusiastic press reviews.<sup>41</sup> It also played a role in launching one of Canada's most successful environmental groups, Pollution Probe, when Gosnell screened it at the University of Toronto in 1969.<sup>42</sup> As the narrator, Stanley Burke put it, deliberately echoing the first chapter of Rachel Carson's *Silent Spring*, "Something mysterious burned the peppers, burned the fruit, dwarfed and shriveled the grains, damaged everything that grew. Something in the air destroyed the crops."<sup>43</sup> Burke interviewed farmers who claimed that their fruit trees had stopped producing, plants had burn marks, or were smaller than ever before. When cattle began suffering from damaged teeth and swollen joints, veterinarians identified the problem as fluoride pollution. The Ontario Federation of Agriculture began to lobby on behalf of the farms in the region, while local citizens formed the "Air Pollution Committee for Moulton and Sherbrooke Townships." The documentary revealed that the owners of the plant, the Electric Reduction Company (ERCO), began paying damages to the farmers in 1966 to compensate them for the damage to their livestock.

Some of the most frightening evidence concerned the health of the farmers themselves. One walked with a visible limp, another complained of achy joints. The producers interviewed Waldbott who claimed that people in the region were suffering from fluoride poisoning, and that they would be endangering their lives if they continued to live on the land. The Minister of Health, Matthew Dymond, insisted that there was no evidence indicating that the plant should be closed.<sup>44</sup> A subsequent public inquiry into the documentary concluded that the fluoride pollution was not sufficient to cause any damage to human health and that drinking milk and eating vegetables and other foodstuffs grown in the area was safe, although they acknowledged that there had been a serious airborne fluoride problem in the years immediately after the plant opened.<sup>45</sup> The CRTC also held hearings, which concluded that the documentary was well-researched, although they expressed reservations about the prominence accorded to Waldbott, whose views about fluoride were not well-accepted in the medical community.<sup>46</sup> Waldbott eventually published

<sup>41</sup> O'Connor, *The First Green Wave*, 22.

<sup>42</sup> Sarah Elton, "Green Power" *University of Toronto Magazine* (Winter 1999). <http://www.magazine.utoronto.ca/feature/canadian-environmental-movement/>, accessed 14 May 2012.

<sup>43</sup> "Transcript of CBC's Broadcast: 'Air of Death'" <http://fluoridealert.org/content/cbc-transcript>, accessed 20 May 2015.

<sup>44</sup> CBC Air of Death (1967) Transcript provided by the Fluoride Action Network, <http://www.fluoridealert.org/cbc-transcript.htm>, accessed 28 February 2013.

<sup>45</sup> *Report of the Committee Appointed to Inquire into and Report Upon the Pollution of Air, Soil and Water in the Townships of Dunn, Moulton, Sherbrooke Haldimand County* (Toronto: Queen's Printer, 1968)

<sup>46</sup> O'Connor, *The First Green Wave*, 29-30.

the results of his research in *Fluoride: The Quarterly Journal of the International Society for Fluoride Research*, a journal that he edited. The International Society for Fluoride Research was a scientific society Waldbott had founded in 1968 to disseminate the results of anti-fluoridation research.<sup>47</sup> According to his study, the people of the area were suffering from arthritis and from nasal and conjunctival disorders. The food consumed by two of his research subjects had much higher than normal values of fluoride.<sup>48</sup> While there was no consensus on the degree to which human health had been harmed in the region, the Dunnville controversy would become an important reference point for Canadian anti-fluoridationists in the years to come.

### **The Impact of the Environmental Critique on Fluoride Debates**

The growing awareness that fluoride was a bio-accumulator and an environmental pollutant would have a dramatic impact on fluoride debates in Canada. By the late 1960s most Canadian cities had already made their decisions about fluoridation. One exception was Montreal where the longstanding Mayor, Jean Drapeau (1954-7; 1960-86), was a fierce opponent on the grounds that it was a violation of civil liberties, and the debate had never really taken off. In January 1971, Claude Castonguay, the Minister of Health, announced that his department favoured the addition of fluoride to drinking waters, saying that it was better to prevent tooth decay than to hire dentists to fill cavities.<sup>49</sup> Because the fluoridation debates in Montreal took place relatively late compared to most of the country, they were deeply impacted by the growing environmental movement. Throughout the 1960s and 1970s, Canadians became aware of the growing problem of water pollution. A slew of articles pointed out that most Canadian cities, including Montreal, dumped vast quantities of raw sewage into surrounding waterways. There was growing awareness of the devastating consequences of mercury pollution, and of the disastrous impact that phosphate-based detergents were having on lakes across the

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<sup>47</sup> Richard G. Foulkes, "Thirty-Five Years of Fluoride" *Fluoride* 35, 4 (2002), 213-227. Waldbott edited the journal until 1982 when he passed away. The editorship was then taken over by his wife, Edith Waldbott who had previously edited the *National Fluoridation News*.

<sup>48</sup> G.L. Waldbott and V.A. Cecilioni, "'Neighborhood' Fluorosis" *Fluoride: International Society for Fluoride Research* 2 (October 1969), 206-123, [http://www.fluorideresearch.org/024/files/FJ1969\\_v02\\_n4\\_p206-213.pdf](http://www.fluorideresearch.org/024/files/FJ1969_v02_n4_p206-213.pdf), accessed February 28, 2013.

<sup>49</sup> "Castonguay asks fluoride boost," *The Gazette*, January 21, 1971, printed in Society to Overcome Pollution, *Water Fluoridation: The Human Diet and Environment* (Montreal: Society to Overcome Pollution, 1971).

country.<sup>50</sup> Environmental protection groups sprang up across the country.<sup>51</sup> Fluoride was never at the centre of these new environmental concerns. Pollution Probe, the leading environmental group in Toronto took no interest in water fluoridation, for example, despite being formed as a result of a showing of “Air of Death.” But the environmental critique did affect the way people thought about fluoridation when it came up for debate.

One of the new environmental groups being formed was The Society to Overcome Pollution (STOP), established in Montreal in 1970. Carol Spindell Farkas, who had a master’s in nutrition from Tuft’s University and was married to Edward Farkas, an engineering professor at McGill, started STOP as part of her work as head of the social action committee at her local Unitarian Church. Using her kitchen as a lab, Farkas tested the phosphate content of 35 different detergents and circulated the information to consumers to persuade them to purchase detergents lower in phosphates.<sup>52</sup> She soon broadened out into other issues: in August 1970, STOP and its francophone equivalent (Société pour vaincre la pollution) established a kiosk at the Man and His World exhibition, showing where raw sewage was dumped into the St. Lawrence and other Montreal waterways. That fall, they arranged a guided bus tour for journalists to Montreal’s most polluted sites for “Survival Day.”<sup>53</sup> By the spring of 1971, STOP had 2000 members, a monthly newsletter and 24 school groups. That summer, they hired 22 university students who investigated air pollution, public transit and the pesticide content of foods.<sup>54</sup> Farkas herself prepared a report on *Water Fluoridation: The Human Diet and the Environment*. The report declared that the

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<sup>50</sup> Courtney Tower, “The People Vs. Pollution,” *Maclean’s Magazine*, January 1970, 1-3; Peter Desbarats, “Enough! Pollute me no more pollution,” *Saturday Night*, October 1970, 16-70; Una Abrahamson, “Of Consuming Interest: Can we Have Clean Homes and Clean Lakes,” *Chatelaine*, April 1970, 26. For more detail on the Montreal scene see: Michèle Dagenais, *Montréal et l’eau* (Montréal: Boréal, 2011), 186-196.

<sup>51</sup> Jane E. Barr, “The Origins and Emergence of Quebec’s Environmental Movement, 1970-1985” (MA Thesis, McGill University, 1995), 58; O’Connor, *Toronto the Green*; Jean-Guy Vallaincourt, “Deux nouveaux mouvement sociaux québécois: le mouvement pour le paix et le mouvement vert” in *Le Québec en jeu. Comprendre les grands défis*, eds. Gérard Daigle et Guy Rocher (Montréal: Les Presses de l’Université de Montreal, 1992), 791-807.

<sup>52</sup> In Toronto, Pollution Probe did similar tests. Reed, ““Let us heed the voice of youth.””

<sup>53</sup> “Polluted area tour marks Survival Day,” *Montreal Star*, October 15, 1970, n.p. Clipping in Personal Papers of Carol Farkas. The National Film Board made a film about STOP and Survival Day. National Film Board, *Persistent and Finagling* Dir. Michael Rubbo (Montreal: National Film Board, 1971).

<sup>54</sup> Barr, *The Origins and Emergence*, 91-4.

“fluoridation of water supplies is an environmental issue.”<sup>55</sup> In an oral interview, Farkas declared that she was not sure why she became interested in fluoride, but she thought that she had probably become aware of the possibility of fluoride toxicity because she had done previous research on tea which naturally contains large amounts of fluoride.<sup>56</sup>

STOP conceded that fluoridation would reduce cavities, but argued that there was no scientific agreement about what constituted a safe dose of fluoride. Farkas showed that Canadians might be getting more fluoride, especially from processed foods, than most previous studies had accounted for. Because fluoride, unlike chlorine, does not evaporate when heated, processed beverages, canned foods and other items often have significantly higher quantities of fluoride than artificially fluoridated water. The report also pointed out that people who ate large amounts of fish or tea (foods high in naturally occurring fluoride) often consumed large amounts of fluoride. Studies outside of North America had shown that even rather low levels of naturally occurring fluorides in the water had led to severe cases of skeletal fluorosis.<sup>57</sup> Farkas followed this up with a second report in 1973, in addition to publishing some of her work in scientific journals, including *Fluoride*, the journal edited by George Waldbott.<sup>58</sup> Like the research papers produced by John Marier and his colleagues at the National Research Council of Canada, Farkas’ studies were carefully researched and written and free of the hyperbolic language favoured by people like Exner and Waldbott.

In 1975, the government of Quebec announced its intention to make water fluoridation mandatory throughout the province. La Société pour vaincre la pollution (SVP) requested a report on the environmental consequences of fluoridation. Le Président du Conseil consultatif de l’environnement submitted this report in the summer of 1975. The first half of the report detailed the presence of fluorides in the environment. The second part examined the effects that water fluoridation would have on people, animals and plants. Citing the research of Marier and Rose, the Conseil Consultatif expressed concern that the amount of fluoride being consumed was increasing because most processed foods were prepared using fluoridated water. They also pointed to a study in Japan that showed

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<sup>55</sup> Society to Overcome Pollution, *Water Fluoridation: The Human Diet and Environment* (Montreal: Society to Overcome Pollution, 1971), 1.

<sup>56</sup> Interview with Carol Farkas, June 27, 2012.

<sup>57</sup> Society to Overcome Pollution, *Water Fluoridation*, 19.

<sup>58</sup> C.S. Farkas and Edward Farkas, “Potential effect of food processing on the fluoride content of infant foods,” *The Science of the Total Environment* 2, 4 (July 1974): 399-405; C.S. Farkas, “Total Fluoride Intake and Fluoride Content of Common Foods – a Review,” *Fluoride* 8, 2 (April 1975): 98-104; C.S. Farkas, “Potential Fluoride Intake of Northern Canadian Indians,” *Fluoride* 10, 3 (July 1977): 137-40.



fluorides accumulating in vegetables on account of the increased use of phosphate fertilizers. They recommended that more research was required before Quebec moved ahead with water fluoridation.<sup>59</sup> SVP was not the only opponent of fluoridation in Montreal. Opposition also came from within the health food movement. In 1975, the well-known Quebec naturopath, Jean-Marc Brunet, became the leader of the Le Front Commun Contre la Fluoration, which began publishing a newsletter, *La Fluoration en Question*.

Brunet had become interested in fluoride several years earlier. A prolific writer and organizer, he founded Le Mouvement Naturiste Social in 1966, with the goal of regenerating Quebec society through the principles of “le naturisme.” His first book *La Réforme Naturiste* (1969) condemned food additives, modern pharmaceuticals, air pollution and fluoride for making Quebecers weak and sickly.<sup>60</sup> In the early 1970s, thousands of people attended annual weekend conferences sponsored by the MNS, and Brunet claimed that the organization had 100,000 members.<sup>61</sup> He published *Dossier Fluor* in 1972. He argued that the aluminum industry was promoting fluoridation to get rid of a toxic waste product and that fluoridation caused cancer, bone loss, kidney problems, “mongolism,” memory loss and allergic reactions. His work had more in common with anti-fluoride critiques put forward by health food storeowners and *National Fluoridation News* in the 1950s and early 1960s than it did with the sophisticated scientific work of John Marier, Dyson Rose and Carol Spindell Farkas.

When the Parti Québécois assumed power in 1976, they suspended the legislation mandating fluoridation. They also asked the Conseil consultatif de l’environnement to produce another report. In 1979, the Conseil consultatif advised that the ecological consequences of artificially fluoridated water had not been sufficiently studied and that there was reason to be concerned about fluoride accumulation in the food chain and the possible interaction of fluoride with other pollutants. They included a chapter on the industrial release of airborne fluorides, which was of particular concern in Quebec, which was an important centre for aluminum production (more than 50% of all fluoride emissions in Canada took place in Quebec.) They recommended that water fluoridation be

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<sup>59</sup> Conseil consultatif de l’environnement, *Conséquences écologiques de la fluoruration de l’eau au Québec* (Québec: Conseil consultatif de l’environnement, 1975).

<sup>60</sup> Brunet, *La réforme naturiste* (Montréal : Éditions du Jour, 1969), 11-14.

<sup>61</sup> Clipping from *Le Journal de Montréal*, 17 mars 1973. Bibliothèque et Archives nationales du Québec, Montréal, Fonds Jean Marc Brunet, Box 1 File 26A ; Daniel Pinard, « Le Combat Naturix », *Le Magazine Maclean*, October 1974, 22, 50-1, 57-8.

permanently halted.<sup>62</sup> As a result, the legislation mandating compulsory fluoridation remained suspended.

Other fluoride debates became more environmentally-oriented in the 1970s as well. The city of Guelph voted on and soundly defeated fluoridation in 1964 but environmental issues played little role in this campaign. In 1972, when fluoridation came up for debate once again, it was overwhelmingly defeated: 75.1% of people voted against it. Geographer Paul Bircham conducted a survey with 128 respondents. Fifty three percent of people who voted against fluoridation said that they had done so because it would affect the purity of Guelph's water supply. Unusually for southern Ontario, Guelph's water supply is drawn from an underground aquifer, the Arkell Spring, and Guelphites have long been proud of their water supply, likely contributing to the strong feelings against fluoridation in this city.<sup>63</sup>

The environmental critique was also having an impact in the United States. In 1973, Edward Groth III, finished his dissertation on air pollution and water fluoridation under the supervision of Paul Ehrlich. Ehrlich was the author of bestselling *Population Bomb* (1968), which drew attention to world population growth as an environmental issue. Groth concluded insufficient research had been done on the safety of water fluoridation and expressed concern that the voices of anti-fluoridation scientists had been repressed. He pointed out that the ecological consequences of fluoridation might be substantial, arguing that airborne fluorides had done significant damage to livestock and that very few studies had shown the impact of fluoridation on waterways or on freshwater food chains.<sup>64</sup> While his dissertation was never published, Groth would go on to have a prominent career as a staff officer at the Environmental Studies Board at the National Research Council and later as a Senior Scientist at the Consumer's Union (the publisher of *Consumer Reports*). He published occasional anti-fluoridation articles and became a revered and respected voice within the anti-fluoridation movement.<sup>65</sup> A less prominent anti-fluoridationist with an environmental critique was Elise Jerard, the Chairman of the

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<sup>62</sup> Report prepared for the Minister of the Environment by the Advisory Committee on the Fluoridation of Water Supplies, *Fluorides, Fluoridation and Environmental Quality* (Sainte Foy: Québec, 1979)

<sup>63</sup> Paul Bircham, "An Investigation of a Public Resource Management Decision: Stalking the Fluoridation Paradox," (MA Thesis, University of Waterloo, 1982).

<sup>64</sup> Edward Groth III, "Two Issue of Science and Public Policy: Air Pollution Control in the San Francisco Bay Area and Fluoridation of Community Water Supplies," (PhD Dissertation, Stanford University, 1973), 377-81.

<sup>65</sup> Edward Groth, "Fluoride Pollution," *Environment: Science and Policy for Sustainable Development* 17, 3 (April/May 1975): 29-38. Brian Martin had Groth provide an appendix to his book: *Scientific Knowledge in Controversy: The Social Dynamics of the Fluoride Debate* (Albany: State University of New York Press, 1991).

Independent Phi Beta Kappa Environmental Study Group, and a member of the scientific advisory board of the Environmental Defense Fund. The Independent Phi Beta Kappa Environmental Study Group also campaigned against nuclear power and the use of DES. In addition to publishing articles about fluoride accumulation in scientific journals, she published a volume of anti-fluoride material, called *Fluoride: The Case of the Protected Pollutant*. The contents included letters testifying to fluoride's allergic potential to scientific papers by Marier and Rose.<sup>66</sup>

The environmental critique of water fluoridation made an anti-fluoridation stance more scientifically respectable at a time of growing concern about the accumulation of cancer-causing food additives and industrial pollutants in our food and water. In the 1950s and 60s, journalists, editorialists and academics often criticized anti-fluoridationists for being ignorant and anti-scientific. A wide body of literature in the 1950s and 60s showed that people who voted against fluoridation were more likely to have lower incomes and lower levels of education than people who voted in favour of fluoridation.<sup>67</sup> Leading dentists and doctors promoting fluoridation insisted that there were no reasonable opponents of fluoridation. People like George Waldbott found it difficult to publish their anti-fluoridation research in medical journals although whether this reflected widespread bias as Waldbott believed, or whether it reflected the poor methodology of some of his studies is hard to know. By contrast, the research of John Marier, Dyson Rose, Carol Spindell Farkas, Edward Groth and others was detailed and sophisticated. They appear to have had no problem getting their work published in respectable journals that were concerned, not with medicine and dentistry, which had been the location of much of the fluoride research, but in journals of nutrition and environmental science. Their work also received positive media reports.<sup>68</sup>

The environmental critique transformed the fluoride debate. Long-term fluoride opponents quickly adopted it: Waldbott's *Fluoridation: The Great Dilemma*, published in 1978, would begin with a chapter on environmental diseases, expand into a discussion of fluoride use in industry, and discuss the problem of the accumulation of fluoride.<sup>69</sup>

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<sup>66</sup> Elise Jerard, *The Case of the Protected Pollutant* (International Scientific Societies, 1968); Elise Jerard and J.B. Patrick, "The Summing of Fluoride Exposures," *Environmental Studies* 4 (1973): 141-155.

<sup>67</sup> William A. Gamson and Peter H. Irons, "Community Characteristics and Fluoridation Outcome," *Journal of Social Issues* 17, 4 (1961): 66-74.

<sup>68</sup> Lear, "Documenting the Case Against Fluoridation"; "Fluoride overexposure possible, NRC says," *Globe and Mail*, February 16, 1972, 1; Jack Anderson, "Into Fluoride's Effects," *Lexington Dispatch*, July 17, 1974, 28. (This article was widely reprinted in newspapers across the US).

<sup>69</sup> George L. Waldbott in collaboration with Albert W. Burgstahler and H. Lewis McKinney, *Fluoridation: The Great Dilemma* (Lawrence, Kansas: Coronado Press, 1978).

Another 1970s book, *Fluoridation and Truth Decay*, put fluoride pollution front and centre.<sup>70</sup> More recently, Christopher Bryson's *Fluoride Deception* (2004) argues that fluoridation was promoted by firms like the Aluminum Company of America to cover up the significant environmental damage caused by airborne fluorides, and the role of fluorides in building nuclear weapons, by emphasizing their dental benefits.<sup>71</sup> Another recent anti-fluoridation book is entitled: *The case against fluoride: how hazardous waste ended up in our drinking water and the bad science and powerful politics that keep it there* (2010).<sup>72</sup> While these books have had little impact outside of the anti-fluoride community, the environmental critique has played an important role in recent referendums. The website of WaterlooWatch, the leading group opposing water fluoridation in that city announces "Do you want these toxins in your water? Why can't water just be water?"<sup>73</sup> In Quebec, the mayor, who supported fluoridation, accused the political party *Renouveau municipal* of "ecoterrorism" when they voted to end fluoridation in that city in 2008.<sup>74</sup> Action Fluor Quebec has made environmental issues a centerpiece of their criticism of fluoridation and a large number of environmental groups (including *les AmiEs de la Terre de Quebec* and *SVP*) are members of the *Le front commun pour une eau saine*.<sup>75</sup> In Calgary, the anti-fluoride debate was spearheaded by Councilwoman Druh Farrell, who is best known for her support of cycling, transit, recycling and sustainable urban growth.<sup>76</sup>

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<sup>70</sup> Gladys Caldwell and Philip E. Zanfagna, *Fluoride and Truth Decay* (La Crescenta, CA: Top-Ecol Press, 1974).

<sup>71</sup> Christopher Bryson, *The Fluoride Deception* (New York: Seven Stories Press, 2004).

<sup>72</sup> Paul Connett, James Beck and HS Micklem, *The Case Against Fluoride: How Hazardous Waste Ended Up in Our Drinking Water and the Bad Science and Powerful Politics that Keep it There* (White River Junction, VT: Chelsea Green Publishing Company, 2010).

<sup>73</sup> Waterloo Watch <http://www.waterloowatch.com/index.html>, accessed 16 May 2012.

<sup>74</sup> "Fluoruration de l'eau à Québec et à Lévis: le débat ne sera pas relancé," *Le Soleil*, January 22, 2011. <http://www.lapresse.ca/le-soleil/actualites/la-capitale/201101/21/01-4362666-fluoruration-de-leau-a-quebec-et-a-levis-le-debat-ne-sera-pas-relance.php>, accessed 28 February 2013.

<sup>75</sup> "Action Fluor Quebec", <http://www.qve.qc.ca/afq/>, accessed May 23, 2012; "Le front commun pour une eau saine", <http://www.qve.qc.ca/afq/Articles/FCES-Pourquoi-douter-de-la-fluoruration.htm>, accessed 23 May 2012.

<sup>76</sup> "Calgary Removing Fluoride from Water Supply", 8 February 2011 <http://www.cbc.ca/news/canada/calgary/story/2011/02/08/calgary-fluoride-city-water-supply-removal.html>, accessed 23 May 2012. For more on Druh Farrell see: <http://www.calgary.ca/Aldermen/Pages/Ward-Offices/Ward-7/Ward-7-bio.aspx>, accessed 23 May 2012.

## Conclusion

During the 1970s, as North Americans became increasingly aware of the chemicals in their food and the pollutants in their water, they began to think about water fluoridation in new ways. From the very beginning, there had been significant opposition to water fluoridation on the grounds that it forced people to take a medicine against their will or that it might have health effects that were as yet unknown. Among anti-fluoride activists, there was an awareness that fluoride was also an industrial pollutant, and a strong suspicion that big businesses including ALCOA and the “sugar trust” had their own reasons for promoting fluoride. Many fluoride activists were also active in the nascent health food movement and were concerned about food additives and pesticide use. But it was rare for anti-fluoride activists to talk in terms of the accumulation of fluoride in the environment. In the late 1960s and early 1970s, this began to change. Researchers with backgrounds in nutrition and industrial hygiene/environmental science began to interest themselves in fluoride research, producing powerful studies that suggested that there was reason to be concerned about the amount of fluoride consumed in fluoridated communities. The high quality of their research, their insistence that they had no quarrel with the proposition that fluoridation had a beneficial impact on children’s dental health, ultimately changed the terms of the fluoride debate. Today, the study of water fluoridation and its effects on health has become a complex, interdisciplinary field with few easy answers. Slowly, even dentists and public health physicians, who were the fiercest proponents of fluoridation, have come to acknowledge the complexity of the issue. For members of the public, deciding whether or not their water should be fluoridated has become even more complicated.

Since the 1970s, cities across Canada have decided to stop fluoridating. This has to do with growing environmental awareness among Canadians who are increasingly skeptical about adding “chemicals” to the water supply and ever more suspicious of the doctors and dentists who reassure them that fluoride is perfectly safe. Perhaps even more significantly, public health officials are beginning to take the environmental critique seriously. In 2010, Health Canada recommended that communities that fluoride their water reduce the dose slightly in order to prevent dental fluorosis and other potential health problems caused by consuming too much fluoride. In doing so, they followed the lead of researchers like Marier and Farkas by taking into account the total body burden of fluoride.<sup>77</sup> Indeed, this approach has become the norm in large-scale

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<sup>77</sup> Health Canada, *Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Fluoride*, December 2010, <http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/2011-fluoride-fluorure/index-eng.php#a913>, accessed 27 February 2013.

studies evaluating the usefulness and effectiveness of water fluoridation. As a result, water fluoridation, which was only adopted vigorously in a few countries (most notably Canada, the United States, Ireland, Australia, New Zealand, and Brazil), may be slowly on its way out.