

# Current Comments®

EUGENE GARFIELD

INSTITUTE FOR SCIENTIFIC INFORMATION®  
3501 MARKET ST., PHILADELPHIA, PA 19104

## Fluoridation, "Texas Teeth," and the Great Conspiracy. Part 1. The Issues

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Some people call it the "Greatest Medical Fraud of the Twentieth Century"<sup>1</sup> (p. 17) and a "poison to the human body."<sup>2</sup> Are they talking about laetrile? vitamin C? chemotherapy? No, it's fluoridation, the addition of fluorides to drinking water, that evokes these strong reactions. Glen S.R. Walker, an electroplating specialist and chairman, Freedom From Fluoridation Federation of Australia,<sup>1</sup> and Martha C. Johnson, director, Safe Water Club of Ingham County, Michigan,<sup>2</sup> are part of a small but outspoken minority who strongly oppose fluoridation. Although it would appear to be a simple public health matter, fluoridation occasions some of the bitterest public debates. Not to be confused with chlorination, a water-purification process we discussed recently,<sup>3</sup> fluoridation is a method for reducing the incidence of dental caries, or tooth decay.

### History of Fluoridation

To understand the issue, we should review the history of fluoridation, with particular attention to the social and political controversies that have surrounded it. Donald R. McNeil, author of *The Fight for Fluoridation*<sup>4</sup> and numerous articles on "this continuing American controversy,"<sup>5</sup> reviews the significant events in this history. About 1902, a Colorado dentist, Frederick S. McKay, be-

gan to study an odd brownish staining or mottling of the teeth in some residents of Colorado Springs. People told him that the mottling came "from something in the water."<sup>6</sup> For the next 30 years, McKay and others worked to identify that "something."<sup>5</sup>

Mottled teeth were not unique to Colorado Springs, where the phenomenon was named "Colorado brown stain." Texans called it "Texas teeth."<sup>4</sup> (p. 3) In fact, the condition occurred in many places around the US. Although the discoloration caused no physical harm, the cosmetic result was often disastrous.

McKay's first attempts to identify the cause of mottled teeth were unsuccessful. Routine chemical analyses of water samples from affected areas failed to show anything out of the ordinary. Eventually, however, McKay found evidence that did convincingly tie mottling to a water supply. Residents of the town of Oakely, Idaho, noticed that children began to develop mottled teeth after the town changed the source of its public water supply. McKay suggested that the town change to yet another water source, which it did. The experiment produced three cohorts of children: one, whose teeth developed after the first change, had mottled teeth; the other two cohorts, whose teeth had developed before the first change or after the second change of water source, had normal (white) teeth.<sup>4</sup> (p. 18-22)

It was H.V. Churchill, chief chemist, Aluminum Company of America (ALCOA), who in 1931 provided McKay with evidence that fluorine was involved in the mottling of teeth. Bauxite, Arkansas, a mining town that produced the aluminum ore of the same name, was affected by mottling. At that time, critics were claiming that aluminum cookware was poisonous, a charge that was later disproven. In the meantime, however, ALCOA officials were afraid that aluminum might be blamed for disfiguring teeth. Churchill performed a series of thorough analyses on Bauxite well water and found very large amounts, 13.7 parts per million (ppm), of fluoride.<sup>7</sup>

In the same year, M.C. Smith and colleagues, chemists from the University of Arizona, confirmed that fluorine caused the mottling. They fed laboratory rats water from St. David, Arizona, a community where mottled teeth were prevalent. In a few weeks they had produced mottling in the rats. When they fed fluorine to another group of rats, they again produced the same disfiguration.<sup>8</sup>

#### **Reduction of Tooth Decay**

In reports published in 1925 and 1928, McKay had noted that, although the mottling was unsightly, those affected by it had very low rates of tooth decay.<sup>6,9</sup> This observation was confirmed by H. Trendley Dean, dental surgeon, US Public Health Service, Washington, DC, who traveled throughout the country collecting water samples. Dean found that wherever people had mottled teeth they also had low rates of decay. Analyzing his data, Dean concluded that fluoride in a concentration of about 1 ppm significantly reduced the incidence of tooth decay without causing mottling.<sup>10</sup>

It is interesting to note that a 1942 paper by Dean<sup>11</sup> continues to be cited today and is core to the 1984 research front "*In vitro* and clinical studies of the

effects of fluoride on tooth enamel and hydroxyapatite dissolution" (#84-0009). We will have more to say about ISI research-front data later.

McKay's and Dean's findings began to attract the attention of public health officials. In 1944 the Public Health Service began a large-scale experiment to test fluoridation as a means of preventing tooth decay. The city of Grand Rapids, Michigan, started adding 1 ppm fluoride to its water supply. The nearby city of Muskegon, without fluoridation but otherwise similar to Grand Rapids, served as a control. Grand Rapids soon showed a sharp decline in tooth decay among children.<sup>4</sup> (p. 42-3)

Excited by the success of this initial trial, Wisconsin dentists, led by John Frisch, began to press for mass fluoridation. As a result, Madison adopted the practice in 1947, and other Wisconsin towns followed suit.<sup>4</sup> (p. 49-64)

The scientific community did not wholeheartedly support an early rush to fluoridation. Many scientists believed that there was insufficient evidence to judge the safety or effectiveness of the process. They favored waiting until the Grand Rapids experiment, scheduled to run until 1954, was complete. The American Dental Association expressed this view twice.<sup>12,13</sup>

In 1950, however, both the Public Health Service and the American Dental Association found the evidence strong enough to endorse fluoridation of public water supplies.<sup>14</sup> Newburgh, New York, had reported that tooth decay there had dropped by one-third after only three years of fluoridation. In Midland, Michigan, authorities found that the average 12-to-14-year-old had about two decayed, missing, or filled teeth compared with a statewide average of seven. Colorado Springs, with a naturally fluoridated water supply, reported a tooth-decay rate only one-third that of Boulder, Col-

orado, which did not have fluoride in its water. These striking results impressed the public health officials, who viewed fluoridation as an effective way to preserve teeth while saving money on dental care.<sup>4</sup> (p. 65-74; 107)

### Opposition Develops

The early successes of fluoridation were soon tempered by a growing opposition to the practice. McNeil cites an example of this. In 1950, yet another Wisconsin town, Stevens Point, considered fluoridation. Frisch promoted it, but the city council rejected it. A women's group then petitioned the council successfully for fluoridation. Opponents countered by demanding a referendum on the issue, and fluoridation was defeated.<sup>4</sup> (p. 85-105)

A factor in the course of events in Stevens Point was a network of opposition to fluoridation that quickly grew throughout the nation. Robert L. Crain, associate professor, Department of Social Relations, Johns Hopkins University, Baltimore, and his colleagues Elihu Katz, Department of Sociology, University of Chicago, and Donald B. Rosenthal, Department of Political Science, State University of New York, Buffalo, have studied this network and its motivations.<sup>15</sup> They note that opposition to fluoridation grew at a time when hysteria about communism in government was also growing. The debate about fluoridation took on some of the overtones of McCarthyism. While the fluoridation issue has at times involved legitimate scientific questions, public debate has often degenerated into bitter ideological fighting and name-calling. For example, when the Public Health Service and the Children's Bureau held a 1951 conference on fluoridation, critics attacked it as part of President Truman's alleged plan for socialized medicine. They also labeled Oscar Ewing, then head of the

Federal Security Administration, as the "leading socialist" in the government. Oddly, since Ewing had at one time been a member of a law firm representing ALCOA, which produced some fluoride, a few of the antifluoridationists imagined there was a conspiracy between the Communists and Big Business!<sup>15</sup> (p. 9)

Opposition to fluoridation led in 1951 to hearings in Washington, DC, by the House Select Committee to Investigate the Use of Chemicals in Food Products. The committee chairman, Representative James J. Delaney, of New York, allowed antifluoridationists to read statements into the *Congressional Record*. Ever since, antifluoridationists have been using these and similar entries on the public record to create an image of "official" approval for their position.<sup>16</sup> The Delaney Committee report, however, did not condemn fluoridation; it merely recommended caution on the part of local water authorities. The Council on Dental Therapeutics of the American Dental Association at the time pointed out that no federal scientific agencies had assisted the committee in its research.<sup>17</sup>

During the 1950s and 1960s, evidence of the efficacy of fluoridation of drinking water continued to accumulate. For example, in Philadelphia, one of the first large US cities to adopt fluoridation, school children showed a remarkable improvement in dental health. A 1963 report by Abram Cohen, then assistant director, Medical Division, School District of Philadelphia, noted that among 6-to-12-year-olds the number with decayed, missing, or filled teeth declined by 34 to 75 percent during the first seven years of fluoridation. The greatest improvement appeared among the six-year-olds, who had life-long exposure to fluoride.<sup>18</sup>

Along with the growing scientific evidence, public acceptance of fluoridation

in the US increased. Many state governments passed laws allowing local authorities to adopt fluoridation. Dental organizations and public health officials became nearly unanimous in supporting fluoridation, and the Public Health Service began a series of annual conferences on fluoridation.<sup>15</sup> (p. 18-20)

While official support increased, the opposition also grew and became more organized and effective. Crain and colleagues found that the number of communities in the US adopting fluoridation each year peaked in 1952 and declined thereafter.<sup>15</sup> (p. 20) Although there have been fluctuations, the rate at which fluoridation has been adopted continues to be low. According to Public Health Service statistics for 1985, 61.4 percent of all Americans served by public water supplies now have fluoridated water.<sup>19</sup>

### People and Issues

Proponents of fluoridation have included dentists and their professional organizations, public health officials, and a wide variety of civic groups, from parent-teacher associations to veterans groups. The opposition has consisted of a coalition of groups with varied interests, including the politically ultraconservative John Birch Society, health-food enthusiasts, chiropractors, and some members of religious groups such as Christian Scientists. In the early years, a significant number of scientists also opposed fluoridation. As evidence about fluoridation has increased, however, opposition in the scientific community has dwindled.<sup>15</sup> (p. 30)

The objections to fluoridation take two basic forms. The first is related to fluoridation itself. Antifluoridationists have claimed that fluorides are dangerous poisons that can cause a variety of diseases. We will examine these claims in Part 2 of this essay.

The second type of objection to fluoridation is based on political arguments. Opponents claim that fluoridation amounts to involuntary mass medication. They argue that, regardless of any benefit, the process violates the principle of freedom of choice. Arthur Selwyn Miller, professor of constitutional law, George Washington University, Washington, DC, outlines what he says are constitutional objections to fluoridation.<sup>20</sup> These are based on violations of the guarantee of due process and freedom of religion. For example, the objection of some Christian Scientists is based on a religious tenet forbidding the use of medications. At least in part, however, the legal positions depend on whether fluoridation is actually medication, as opponents assert, or merely an adjustment of the natural content of water, as some proponents claim. Various authorities have cited other accepted practices, such as chlorination of water and mandatory immunization of school children, to justify fluoridation. Miller points out that the US Supreme Court has never ruled on the constitutionality of fluoridation.<sup>20</sup> We should note, however, that according to F.J. McClure, chief, Biochemistry Laboratory, National Institute of Dental Research, Bethesda, the Supreme Court has had many opportunities to review the fluoridation issue and has always declined to question lower court rulings upholding the constitutionality of fluoridation.<sup>21</sup>

There may be other reasons as well for the continuing debate over fluoridation. Crain and colleagues examined the theory that the issue represents an outlet for expression by segments of the population who feel alienated from the rest of society. They point to the types of groups that frequently form the antifluoridation movement. Although these groups are not particularly effective in promoting their own views or programs,

their actions are magnified by political structures at the local level that allow small, vocal minorities to exert control over political processes.<sup>15</sup> (p. 31-51)

Three professors of psychiatry, Judd Marmor, University of California, Los Angeles; Viola W. Bernard, Columbia University, New York; and Perry Ottenberg, University of Pennsylvania Medical School, Philadelphia, have studied the psychodynamics of groups opposed to various public health programs, including fluoridation. They cite factors ranging from objections based on science and reason (at least in the early days) to individual desires for self-aggrandizement and power, as well as irrational anxieties and ignorance. Noting that opposition is part of a reaction to social change in general, they trace its origins to factors that may be either external to the individual or part of a person's basic psychological makeup.<sup>22</sup>

The fluoridation issue is not restricted to the US. According to the Fluoridation Society Ltd., London, over 300 million people worldwide drink water with natural or artificially maintained optimal levels of fluoride.<sup>23</sup> Dennis H. Leverett, chairman, Department of Community Dentistry, Eastman Dental Center, Rochester, New York, notes that the need for decay prevention is growing in developing countries as they adopt sucrose-rich Western dietary habits that contribute to tooth decay.<sup>24</sup>

John S. Small, information specialist, National Institute of Dental Research, reports that European nations, as well as Australia and New Zealand, have considerable experience with fluoridation. Not surprisingly, the controversy surrounding fluoridation has also reached other nations. According to Small, some of the same people who oppose fluoridation in the US have taken their cases abroad.<sup>25</sup>

Fluoridation provoked the longest and most expensive legal battle in Scottish history. The judge, Lord Jauncey, stated in a 1983 decision that fluoridation reduces tooth decay and presents no health risks. He ruled, however, that it is not within the power of the local authorities to fluoridate the water.<sup>26</sup> Similarly, the governments of the Federal Republic of Germany and The Netherlands have decided that national fluoridation programs do not conform to their laws. In contrast, the German Democratic Republic uses fluoridation widely, and Ireland requires it nationally.<sup>25</sup> In a recent development, the British Parliament passed a law that will make it easier for local water authorities to institute fluoridation.<sup>27</sup>

Let's leave the political debate now and learn what the scientific literature has to say about fluoridation.

#### ISI Research Fronts

A search of ISI®'s databases turned up more than 550 books and articles related to fluoridation published between 1972 and 1985. Table 1 shows some of the journals that have published articles on the subject; the table also gives a 1984 impact factor for each journal. Of particular interest is *Fluoride*, the journal of the International Society for Fluoride Research. Founded by George Waldbott, a physician and prominent antifuoridationist, it is the only journal devoted exclusively to the subject of fluorides. Eight of the journals in Table 1, indicated by asterisks, were listed as core dentistry journals in an earlier essay.<sup>28</sup>

Of the 20,000 research fronts we identified in 1983 and 1984, 12 are directly related to fluoridation. Most of these deal with purely scientific evidence. One research front, however, "Community at-

**Table 1:** Selected list of journals reporting on fluoride/fluoridation research. A = name. First year of publication is given in parentheses. An asterisk next to the title indicates the journal was part of the core identified in the 1982 study of dental literature. B = 1984 impact factor, which is equal to the number of citations received by 1982-1983 articles in a journal divided by the number of articles published by the journal in that same period.

A	B
American Journal of Public Health (1911)	1.88
*Archives of Oral Biology (1959)	1.05
*British Dental Journal (1880)	0.79
*Caries Research (1967)	1.47
*Community Dentistry and Oral Epidemiology (1973)	0.85
Fluoride (1968)	0.31
*International Dental Journal (1950)	0.58
*Journal of Dental Research (1919)	2.27
Journal of Epidemiology and Community Health (1947)	1.01
*Journal of the American Dental Association (1913)	0.86
Public Health Reports (1878)	0.69
*Scandinavian Journal of Dental Research (1893)	0.94
Toxicology (1973)	1.23
Toxicology Letters (1977)	0.84

titudes and fluoridation for dental caries prevention" (#83-2778), addresses the social issues we have discussed. This research front centers on 6 core papers, cited by 20 other papers in 1983. A 1981 core paper, by Robert Isman, dental health officer, Multnomah County Department of Human Services, Portland, Oregon, reviews some of the political aspects of fluoridation and recommends ways of promoting the process. It is unusual for such a recent paper to be a core document.<sup>29</sup> A 1980 paper by H.S. Horowitz, National Institute of Dental Research, examines fluoridation as a preventive dentistry measure, with consideration of some of the problems in ob-

taining its adoption.<sup>30</sup> A 1968 report by H.G. McCann, Forsyth Dental Center, Boston, is a methodological paper dealing with the measurement of fluoride in mineralized tissues.<sup>31</sup> Two 1978 papers, one by K. Binder, W.S. Driscoll, and G. Schützmannsky, Children's Dental Clinics of Vienna, Austria,<sup>32</sup> and one by J.M. Birkeland and P. Torell, Institute of Community Dentistry, University of Oslo, Norway, and Public Health Services, Gothenburg, Sweden,<sup>33</sup> discuss methods for preventing tooth decay. Much of the social research on fluoridation is summed up in a 1980 review by P. Jean Frazier, associate professor, Department of Health Ecology, University of Minnesota Schools of Dentistry and Public Health, Minneapolis.<sup>34</sup> We will consider research fronts related to the scientific issues in Part 2.

### Summary

Our discussion thus far has given some indication of the nature of the political controversy surrounding fluoridation. While the political questions in many cases remain to be resolved, most of the scientific questions have undergone extensive investigations. In Part 2 we will examine what research has shown about the effects of fluoridation and relate the evidence to the objections raised by the antifluoridationists.

\* \* \* \* \*

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