Fluoride's REVENGE

Has this cure, too, become a disease?

BY DANIEL GROSSMAN

Terry Rich, a Colorado Springs dentist, recently treated Molly, a teenaged patient, for an ugly brown stain on her front teeth. "She was dissatisfied with her teeth," he recalls, noting that dark brown horizontal lines marred an otherwise straight smile. Though his acid-etching treatment failed to remove the stain, Rich hopes to try again with a different formula. Molly is Rich's own child. Like his other two daughters, Elizabeth and Ruth, and hundreds of thousands of other people across the nation, she suffers from dental fluorosis, an ailment caused by excessive levels of the chemical fluoride in naturally mineral-rich water.

An investigation of the health effects of fluoride, including two Freedom of Information Act requests that pried loose more than 10,000 pages of documentation, shows that a Government regulation intended to prevent fluorosis was derailed by a decades-old controversy between two agencies over a legally unrelated Government policy.

Officials at the Public Health Service, the Federal Government's all-purpose health agency, stopped the Environmental Protection Agency from issuing a standard to prevent dental fluorosis because they feared the rule would disrupt their own plans to protect dental health. As a result, what might have been an open public debate became an obscure internecine battle between two bureaucracies, each with its own idea of what makes good public policy. Though dental fluorosis is hardly a life-threatening ailment, this story demonstrates how a powerful agency, intent upon enforcing its own view of the public good, can suppress anyone who gets in its way.

On October 31, 1985, employees of the EPA were circulating a memo written by Paul Price, a staff member in the regulatory agency's drinking-water program. It was a spoof of an official press release issued that day to announce a new regulation.

"The Office of Drinking Water," it began, "proudly presents their new improved FLUORIDE REGULATION, or 'How We Stopped Worrying and Learned to Love Funky Teeth.'" The takeoff reflected the frustration felt by staff members who had invested years in developing the protective regulation only to see it diluted because of pressure from another agency.

Though fluoride is best known as the chemical added to drinking water and toothpaste to prevent dental decay, it can also cause a variety of harmful ailments, including one that puts brown stains on teeth and may make them brittle and crumbly. The amount of fluoride added to drinking water to prevent tooth decay is about the same as the amount that can cause moderate staining.

Such staining, known as dental fluorosis, was discovered even before the beneficial effects of fluoride were recognized. The convoluted history of fluoride—perhaps one of America's most bizarre encounters with a chemical contaminant—holds the secret to why two agencies, each ostensibly concerned about the effects of fluoride on teeth, should clash.

Dental fluorosis was first noted in Colorado Springs at the turn of the century by a young dentist who became obsessed with discovering the cause of the disease, then known as "Colorado Stain." When minute amounts of fluoride dissolved in drinking water were identified as the culprit in 1931, the Public Health Service dispatched H. Trendly Dean, a talented epidemiologist, to determine the concentration at which the disease occurs.

"In moderate cases, all enamel surfaces of the teeth are altered," Dean wrote. "Brown stain is frequently a disfiguring feature." In severe cases, he added, "brown stains are widespread and teeth often present a corroded-like appearance." The disease, researchers later discovered, is caused in children up to the age of eight during the formation of their teeth.

Fluoride would probably be treated today with the same degree of concern as any other contaminant that affects human health, were it not for the fact that Dean also confirmed an observation that changed the course of preventative health care. He showed that people with dental fluorosis had fewer cavities—then considered a public-health scourge. This discovery was greeted with enthusiasm by activists in the dental community, especially in Wisconsin, a stronghold of the Progressive movement, where a small group of energetic dentists campaigned vigorously to add fluoride to drinking water.

Dean and his agency were more circumspect, as were the American Dental Association and the American Medical Association, which preferred to await the results of investigations of the benefits of fluoride. But by the mid-1940s, a few communities began experimenting with fluoridation—as the process of adding fluoride came to be known. By 1950, the Public Health Service, under increasing pressure from advocates, endorsed the process.

As a full-blown campaign to fluoridate the entire country—nourished by the once-skeptical Public Health Service—began to build, grass-roots opposition appeared as well. Some critics questioned the safety and efficacy of fluoridation, and others raised ethical, moral, and philosophical objections to the injection of a potent

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The struggle over fluoride regulation is a clash of two different cultures. One side is rooted in the 1950s: Health problems are solved with medication, and doctors know best. The other side, environmental scientists, says nothing should be allowed in drinking water unless its safety can be proven.

chemical into a public resource. There were crackpots, too, who countered advocates of fluoridation with McCarthy-era anticommunist and anti-Semitic rhetoric. One activist who gained notoriety in California claimed that fluoridation would produce "moronic atheistic slaves." It would "weaken the minds of the people," she said, and make them prey to communists. Another called fluoridation a Jewish attempt to "weaken the Aryan race mentally and spiritually."

When the strategy of challenging fluoridation in local referendums began to threaten the nationwide endeavor, proponents responded by tarring all opponents—indeed the very idea of opposition—with this "quack" brush. According to fluoridation advocate G.F. Lull, for example, "We will find in the antifluoridation camp the antivaccinationists, the antivivisectionists, the cultists and quacks of all descriptions: In short, everyone who has a grudge against legitimate scientific progress."

The controversy over fluoridation is no longer as visible as it was in the 1950s, but it continues. The Public Health Service is still trying to make fluoridation universally available, and opponents are still at work with roadblocks and sandbags. Today, proponents note with alarm that fluoridation was actually rejected in about 100 of the more than 150 referendums on the measure in the past decade. With only two-thirds of the public water supplies served by what dentists consider the optimal level of fluoride today, the longstanding Public Health Service goal of 95 per cent by 1990 was recently lowered to 75 per cent by the year 2000.

Though many beneficial chemicals are dangerous when consumed at excessive levels, fluoride is unique because the amount that dentists recommend to *prevent* cavities is about the same as the amount that *causes* dental fluorosis. The Public Health Service recommends that about one part of fluoride be added for every million parts of water to prevent tooth decay—the amount depends on the climate—while the Environmental Protection Agency says water with as little as 0.7 parts per million of fluoride can cause moderate dental fluorosis in a small percentage of the people who drink it.

Today, according to the EPA, there are 1,300 communities—mostly rural towns—serving nearly two million people with water naturally enriched with fluoride in concentrations greater than two parts per million (ppm). And there are 200 communities serving more than a quarter-million people with water exceeding four ppm. At two ppm, according to agency studies, 10 per cent of all children will contract either moderate or severe fluorosis. At four ppm, nearly half the children will be afflicted. The Public Health Service estimates that nearly half a million American schoolchildren suffer from mild or severe dental fluorosis.

The EPA issued a regulation to protect the public from dental fluorosis in 1977, under authority of the then newly enacted Safe Drinking Water Act. The rule prohibited public water suppliers from distributing water with more than two ppm of fluoride, though the deadline for compliance extended until 1984. As the deadline neared, however, none of the offending suppliers moved to comply, since defluoridation equipment costs hundreds of thousands of dollars. Instead, EPA came under increasing pressure to reexamine the rule. The regulation was a temporary standard, promulgated hastily with the expectation that the agency would later issue a permanent rule based on further deliberations.

EPA staff scientists were convinced of the need to prevent fluorosis. "This was the only contaminant up to this time that we knew had a human health effect," recalls David Schnare, an EPA drinking-water analyst. Other drinking-water contaminants, he explains, were recognized by the results of animal studies only.

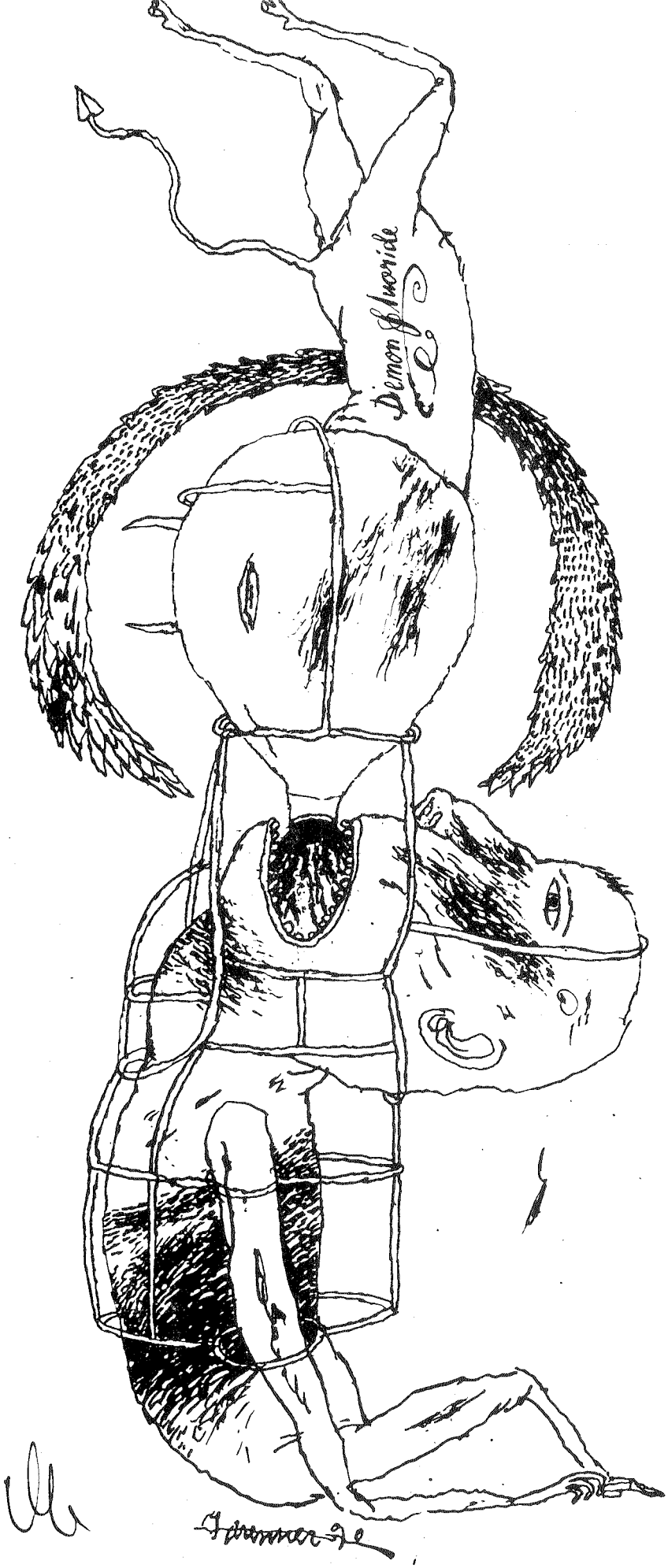
Nevertheless, EPA was besieged by petitions from state governors and dental officials to weaken the standard or, better yet, replace the legally binding regulation with a less burdensome, voluntary standard. But voluntary standards are typically ignored.

Dental and other public-health officials opposed the binding rule because they feared EPA would encourage the antifluoridation camp and hinder the ongoing effort to fluoridate the entire country. EPA's plans to regulate fluoride, said John Daniel, a dental official in South Carolina, "served only to stimulate ardent antifluoridationists in their fanatic quest to associate fluoride with every disease and unpleasantness known to mankind."

But many members of the medical community are cautiously beginning to question forty years of doctrinaire advocacy of fluoridation. Even Public Health Service officials are noting today that fluoride may not be as effective as they once claimed. "Perhaps we have been too much the crusaders," says Canadian dental official Alan Gray in calling on his colleagues to reconsider the benefits of fluoridation.

State governments opposed the binding regulation for another reason: because defluoridation is expensive and therefore politically unpalatable. According to EPA estimates, for instance, a typical family in a community that installed defluoridation equipment could expect an increase in its water bill of between $20 and $100 annually.

Though the Public Health Service has long been the chief Federal advocate of fluoridation—and therefore a less-than-neutral judge—EPA in 1981 asked Surgeon General C. Everett Koop, a Public Health Service leader, to convene a panel to advise the agency on the relationship between fluoride in drinking water and dental fluorosis. It was an unusual step; according to Joseph Cotruvo, the EPA official directly responsible for drinking-water standards, EPA had never



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before asked the Surgeon General to conduct such a review of a chemical, nor has it since.

Koop's office assembled a committee of dental researchers in various branches of the Service. Completed in 1982, their report concluded that dental fluorosis, though "cosmetically objectionable," is not a health hazard. Summarizing the report, Koop wrote to EPA: "No sound evidence exists which shows that drinking water . . . in the U.S. has an adverse effect on dental health."

Public Health Service documents verify that the wording of Koop's letter was intended to hinder EPA plans to set a binding fluoride standard. Unless EPA demonstrates that a contaminant has a "health effect," the agency cannot legally set a binding standard.

"If we send this letter," Koop explained in a memo to Edward Brandt, his superior in the Public Health Service, "it means that [EPA] would not be able to publish [binding] drinking-water regulations." Then he advised, "I think we should go with this letter, in spite of the fact that EPA will not like our response."

Still eager to demonstrate the need to regulate fluoride, the EPA asked the Surgeon General to assemble another panel in 1983, this time to consider the nondental effects of fluoride. A transcript of the panel's two-day meeting shows that, despite its nondental mandate, the panel was especially disturbed by what it learned about dental fluorosis. "You would have to have rocks in your head to allow your child much more than two parts per million," said Stanley Wallach, then medical-service chief of the Veterans Administration Medical Center in Albany, New York.

In the final draft of its report, panel chair Jay Shapiro concluded, "There was a consensus that . . . dental fluorosis per se constitutes an adverse health effect that should be prevented." Shapiro wrote a memo warning that "because the report deals with sensitive political issues which may or may not be acceptable to the PHS,

it runs the risk of being modified at a higher level or returned for modification." He attached the memo to his draft and sent them on to John Small, a Public Health Service official. Small, in turn, forwarded the draft to Koop.

The final report, which Koop sent the EPA a month later, included none of the Shapiro draft's conclusions about dental fluorosis. Instead, it concluded that it was "inadvisable" for children to drink water containing high levels of fluoride to prevent the "uncosmetic effect" of dental fluorosis. Koop had again foiled EPA by repeating his conclusion that dental fluorosis is not an "adverse health effect."

When contacted recently, members of the panel assembled by the Public Health Service expressed surprise at their report's conclusions; they never received copies of the final—altered—version. EPA scientist Edward Ohanian, who observed the panel's deliberations, recalled being "baffled" when the agency received its report. But, he added, "It's what they give us in writing that counts."

But William Ruckelshaus, then the administrator of EPA, wanted to set a binding standard to prevent dental fluorosis, so EPA tried one more time. In 1984, Ruckelshaus asked the National Institute of Mental Health to assemble a panel to examine the *psychological* effects of dental fluorosis. This time the request was submitted directly to NIMH rather than through the office of the Surgeon General.

Although there was no body of research on the psychological effects of dental fluorosis per se, the panel was guided by numerous studies of facial attractiveness and the behavioral impacts of other dental impairments, such as cleft lip and palate. Panel members were also impressed by photographs they were shown of the teeth of people suffering from severe dental fluorosis. They concluded that people with moderate or severe cases risked "psychological and behavioral problems or difficulties."

EPA staff members were pleased with the results of this study. "The staff response was: Here is our silver bullet," says Paul Price, then an analyst working on the standard. He recalls that the staff was vacillating between recommending a standard of one ppm or two ppm, to prevent the psychological effects of dental fluorosis.

Ruckelshaus was shown a set of pictures of dental fluorosis at a high-level meeting in July 1984, recalls drinking-water analyst Schnare. Ruckelshaus's comment: "That's an adverse health effect." But he stepped down as EPA administrator in January 1985 and was replaced by Lee Thomas, a man less sympathetic to staff concerns about dental fluorosis.

Recent interviews confirm that the staff was preparing at the time to recommend that Thomas issue a one-ppm standard. "It is legally and scientifically indefensible to set the [standard] at a level other than optimum (e.g., 1 ppm)," reads the draft of a memo prepared for Thomas's approval.

A handwritten note scribbled on this draft, however, says a higher-level office, controlled not by staff scientists but by political appointees, preferred a binding standard of four ppm, justified by the threat of skeletal fluorosis, another effect of fluoride, but a much less common one. The note added, "And they have the final say!"

The final draft, completed a few weeks later, concluded that dental fluorosis is merely a "cosmetic effect" and recommends a binding standard of four ppm, and a voluntary one of two ppm. When issued six months later, the standard followed this recommendation.

One drinking-water official believes Thomas succumbed to pressure. A native of South Carolina, a state abundantly endowed with fluoride-rich water, Thomas listened not to his staff but to Republican Senator Strom Thurmond, a relentless opponent of the fluoride standard. Edward Groth of the Consumers Union, who wrote a doctoral dissertation on the fluoridation controversy, surmises that Thomas took "the path of least resistance" in following the lead of the Surgeon General.

The technical staff was "devastated" at the decision to go with a standard of four ppm instead of one, according to Paul Price, who managed the writing of the standard and its official justification issued by the EPA. But, he says, once the decision was made, "there were arguments that could be made to justify it."

Price calls the struggle over fluoride regulation "a clash of two different cultures." The Public Health Service, he says, was guided by a 1950s-era attitude that health problems are solved with medication and that doctors know best; anyone questioning this is a crackpot. The Environmental Protection Agency, in contrast, works on the principle—and is staffed with scientists who believe—that nothing should be allowed in drinking water unless its safety can be proven. This conviction dictates stringent regulations justified by conservative analyses with ample margins of safety. In the case of fluoride, these two philosophies collide.

In Colorado Springs, where dental fluorosis was first studied almost a century ago, fluoride levels today reach nearly four ppm. Dentist Terry Rich thinks this level is too high, though he concedes the city couldn't afford a treatment plant even if regulators required it.

And he views the high level of fluoride in his city's water as an opportunity for business. "It could be a money-making thing in my practice," he says, musing about treatment for people suffering from dental fluorosis—"if only I could figure out a way to do it." ■