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ABSTRACTS (Volume 14)



FLORIDA STATE
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HIGHLIGHTS IN NORTH AMERICAN LITIGATION DURING THE TWENTIETH CENTURY ON ARTIFICIAL FLUORIDATION OF PUBLIC WATER SUPPLIES

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I. INTRODUCTION***

Fluoride is an ubiquitous substance in our environment. It is naturally present in public water supplies, bound with calcium, iron, magnesium, or other minerals, usually at a level of around 0.2-0.4

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ppm. Except incidentally, this article will not address the natural presence of fluoride in drinking water, which is a distinct question. The focus of this article will be the artificial fluoridation of public water supplies which occurs when the fluoride content of drinking water is artificially adjusted from its natural level to a desired level of 0.9-1.2 ppm. This change is effected by adding sodium silico fluoride, hydrofluosilicic acid, or some such industrial waste product, which releases free fluoride ions into water consumed by human beings.¹

The theory behind this practice, which now affects about 130 million people in the United States, is that the ingestion of fluoride will harden the surfaces of teeth and make them less susceptible to dental caries. The literature is extensive on whether this practice does or does not reduce tooth decay, and whether it is or is not safe.² The standard work, done under auspices of the American Dental Association (ADA) and the United States Public Health Service (USPHS) is the *Newburgh-Kingston Caries-Fluorine Study: Final Report*.³ Published over forty years ago, it proudly concluded that artificial fluoridation of public water supplies dramatically reduces tooth decay in humans, at no risk to human health.⁴ In language tinged with contemporary fanaticism, the *Final Report* announced, "The opposition stems from several sources, chiefly food faddists, cultists, chiropractors, misguided and misinformed persons who are ignorant of the scientific facts on the ingestion of water fluorides, and, strange as it may seem, even among a few uninformed physicians and dentists."⁵

1. See GEORGE L. WALDBOTT, M.D. ET AL., FLUORIDATION: THE GREAT DILEMMA 47-54, 148-74 (1978) for a detailed discussion of the absorption of fluoride, mainly as free ions, into the soft tissues of the human body. On the other hand, when fluoride is naturally present in public water supplies, it is generally bound with calcium and other minerals and, in such form, it does not readily disassociate and so is more readily excreted. Experiments with trout indicate that fluoride in water so bound tends to be less toxic. See Joseph W. Angelovic et al., *Temperature and Fluorosis in Rainbow Trout*, 33 J. WATER POLLUTION CONTROL FED'N 371 (1961). Hence, the artificial presence of fluoride in drinking water should be considered separately from its natural presence, at least in connection with questions about whether or not fluoride in drinking water produces harmful side effects.

2. The most respected scientific works, published during the twentieth century in support of artificial fluoridation of public water supplies, are WORLD HEALTH ORGANIZATION, FLUORIDES AND HUMAN HEALTH (1970), and FRANK J. MCCLURE, U.S. DEP'T OF HEALTH, EDUCATION, AND WELFARE, WATER FLUORIDATION: THE SEARCH AND THE VICTORY (1970). The work of WALDBOTT ET AL., *supra* note 1, is a comprehensive and powerful rebuttal. Considerable research has been done since these classic treatises were published.

3. Herman E. Hilleboe et al., *Newburgh-Kingston Caries Fluorine Study: Final Report*, 52 J. AM. DENTAL ASS'N 290 (1956).

4. See *id.* at 313-14, 316-19 (1956).

5. *Id.* at 294.

From the beginning, this ostentatious pronouncement has set the tone of ADA and USPHS activists and others promoting this practice in the face of growing opposition from eminent scientists and physicians. The ultimate merits of the issues in science and medicine aside, there has always been learned and respectable opposition to artificial fluoridation of public water supplies,⁶ and all attempts to deny it can only be characterised as irresponsible.

A few preliminary questions need to be asked. The first is whether the natural or artificial level of fluoride in public water supplies really has any beneficial effect in reducing tooth decay. The main difficulty with the experimental runs at Newburgh and Kingston in New York and elsewhere is that tooth decay is enhanced or diminished by innumerable factors including dietary, socio-economic, environmental, hygienic, and many others. Thus, criticism was voiced, initially in a doctoral dissertation,⁷ that there was no control for known and unknown variables and, consequently, the conclusions on the reduction of tooth decay associated with fluoridation were invalid.

Subsequent research, involving vastly more data and sophistication, has entirely upset the Newburgh-Kingston orthodoxy.⁸ It has since been persuasively demonstrated that the lowest rates of tooth decay in children occur in areas where the fluoride level is about 0.2-0.4 ppm, which is the normal level in most parts of the world.⁹ From all published studies on the question in Europe and North America,

6. See, e.g., *Hearings on H.R. 2341 Before the House Comm. on Interstate and Foreign Commerce*, 83d Cong. 62-86 (1954) (statement of Frederick Exner, M.D.). In his time, George Waldbott, M.D., was the dean of physicians against fluoridation. His pioneering book, *A STRUGGLE WITH TITANS* (1965), is bound to be of great interest to scientific historians in future years. He was a founder of the International Society for Fluoride Research, a learned society of about five hundred scientists who specialize in the field, publishing a quarterly journal entitled *Fluoride*.

7. See Edward S. Groth III, *Two Issues of Science and Public Policy: Air Pollution Control in the San Francisco Bay Area and Fluoridation of Community Water Supplies 146-462* (1973) (unpublished Ph.D. dissertation, Stanford University) (on file with University Microfilms in Ann Arbor, Michigan).

8. See, e.g., H. Kalsbeek & G.H.W. Verrips, *Dental Caries Prevalence and the Use of Fluorides in Different European Countries*, 69 *J. DENTAL RES.* 728 (1990); Rudolph Ziegelbecker, *WHO Data on Dental Caries and Natural Water Fluoride Levels*, 26 *FLUORIDE* 263 (1993) (setting forth impressive analyses of data published by the World Health Organization). Trends now evident in Newburgh and Kingston indicate no significant differences in tooth decay rates between the two cities, although dental mottling is somewhat higher in fluoridated Newburgh. See, e.g., Jayanth V. Kumer et al., *Trends in Dental Fluorosis and Dental Caries Prevalences in Newburgh and Kingston, NY*, 79 *AM. J. PUB. HEALTH* 565 (1989); Jayanth V. Kumer et al., *Changes in Dental Fluorosis and Dental Caries in Newburgh and Kingston, New York*, 88 *AM. J. PUB. HEALTH* 1866 (1998); Jayanth V. Kumer et al., *Recommendations for Fluoride Use in Children*, *N.Y.S. DENTAL J.*, Feb. 1998, at 40.

9. See, e.g., Yoshitsugu Imai, *Relationship Between Fluoride Concentration in Drinking Water and Dental Caries in Japan*, 6 *FLUORIDE* 248 (1973).

it has been shown that, while there is a strong positive relationship between dental mottling and the natural level of fluoride in drinking water, there is no statistical relationship between the extent of tooth decay and the natural level of fluoride in drinking water.¹⁰ In more recent years, it has been observed that tooth decay rates have decreased as fast in unfluoridated areas as in fluoridated areas.¹¹ From massive data gathered by the government of the United States, it has been revealed that there is no statistical relationship between rates of tooth decay in children and the extent or duration of artificial fluoridation of public water supplies.¹²

Another question is whether public officials of the United States have been honest in levelling with the American people about the potential harmful effects of artificially releasing fluoride into the environment. In this regard, some attention needs to be given to the seminal work of Dr. Alfred Taylor, a biochemist at the University of Texas. The facts have been written up by reputable scholars¹³ and make up an important episode in scientific history.

In the early 1950s, Dr. Taylor undertook a series of preliminary experiments by which it appeared that cancer-prone mice consuming water treated with sodium fluoride had shorter life spans than mice drinking distilled water.¹⁴ Because the mice in both the control and experimental groups ate chow containing measurable fluoride, probably as CaF, as he learned after his initial runs, Dr. Taylor replicated his earlier work, but used chow containing negligible fluoride. He ran twelve experiments using 645 cancer-prone mice. He found that, as measured for statistical significance, cancer-prone mice drinking water containing fluoride, introduced as NaF, had shorter life spans than mice drinking distilled water.¹⁵ In 1954, the results of Dr. Taylor's reruns were published in a refereed journal.¹⁶

Dr. Taylor's work was published at a politically sensitive time, because the last stages of the much-boasted surveys at Newburgh and Kingston were underway. The obvious meaning of Dr. Taylor's

10. Rudolph Ziegelbecker, *Natürlicher Fluoridgehalt des Trinkwassers und Karies* [Natural Fluoridation of Drinking Water and Caries], 122 GWF WASSER/ABWASSER 495 (1981), translated in 14 FLUORIDE 123 (1981).

11. John Colquhoun, *Child Dental Health Differences in New Zealand*, 9 COMM. HEALTH STUD. 85 (1987).

12. John Yiamouyiannis, *Water Fluoridation and Tooth Decay: Results from the 1986-1987 National Survey of U.S. Schoolchildren*, 23 FLUORIDE 55 (1990)

13. See, e.g., WALDBOTT ET AL., *supra* note 1, at 222-25.

14. See *id.* at 222.

15. See *id.* at 222-23.

16. See Alfred Taylor, *Sodium Fluoride in the Drinking Water of Mice*, 60 DENTAL Dig. 170 (1954).

results was that a possible danger to public health had been overlooked, and that widespread fluoridation should be delayed until the situation had been clarified. However, the ADA and the USPHS had already endorsed and begun the drive to promote fluoridation.

The embarrassment, therefore, had to be addressed. In the *Final Report*, reference was made to Dr. Taylor's original tests two years after the positive results of his reruns had been peer-reviewed and published. Then it was said, contrary to the known state of world literature:

The reports by Alfred Taylor, a biochemist at the University of Texas, on the increased incidence of cancer in mice drinking fluoride-treated water have been shown to be unfounded, since the food that he was giving the mice had many times the fluoride content of the drinking water, and the food was supplied both to the control and experimental groups. Subsequent tests did not confirm the differences.¹⁷

Ever since, USPHS officials have insisted, contrary to known facts, that Dr. Taylor's reruns were never done and never published, and that no work supporting Taylor's results exists or has ever been published. For example, in a standard history of the National Institute of Dental Health, published thirty-five years after Dr. Taylor's work first appeared in a refereed journal, Roth Roy Harris said, "Alfred Taylor, the investigator with a doctorate in biochemistry, indicated that he would not publish his findings because he was unable to confirm those results in a second experiment."¹⁸ Harris added still another misrepresentation, also contrary to known facts, "A literature search of scientific journals failed to show any publication of this work by Taylor -an indication that it was not subjected to review by his peers."¹⁹ The most powerful forensic evidence of the importance of Dr. Taylor's work is that USPHS officials have done so much to conceal it.

After his first study, Dr. Taylor and his wife, also a Ph.D. biochemist, published the results of yet another large-scale study, in which fluoride in water, introduced as NaF, was shown to induce growth in implanted tumors in mice.²⁰ Dr. Taylor's pioneering work

17. Hilleboe et al., *supra* note 4, at 313.

18. RUTH ROY HARRIS, DENTAL SCIENCE IN A NEW AGE, HISTORY OF THE NATIONAL INSTITUTE OF DENTAL RESEARCH 112 (1989).

19. *Id.* at 396 n.33.

20. See Alfred Taylor & Nell Carmichael Taylor, *Effect of Sodium Fluoride on Tumor Growth*, 119 PROC. OF SOC'Y FOR EXPERIMENTAL BIOLOGY AND MED. 252 (1965).

has been confirmed and reconfirmed by a considerable multitude of laboratory studies done by world class scientists, all published in peer-reviewed journals.²¹ Meanwhile, it has been held in some environmental litigation during the twentieth century that, if laboratory tests indicate the capacity of a certain substance to produce harmful side effects in laboratory animals, the same substance may also be presumed deleterious to man in the environment.²²

The main inquiry of this article will be whether the several States have constitutional authority to impose artificial fluoridation of public water supplies. The question depends in part on scientific and medical facts. As we shall relate in detail, trial judges over the past twenty years have repeatedly found, after hearing experts, that fluoridation is injurious to public health. We proceed, first, to review the legal fundamentals.

II. THE NATURE OF POLICE POWER

The first clause of Article I, Section 8 of the United States Constitution states that Congress shall have the power to "provide for the common Defence and general Welfare." James Madison showed that this provision was intended to define the objects of federal spending, not to confer a general legislative authority upon

21. See, e.g., Irwin H. Herskowitz & Isabel L. Norton, *Increased Incidence of Melanotic Tumors in Two Strains of Drosophila Melanogaster Following Treatment with Sodium Fluoride*, 48 GENETICS 307 (1963); Chong Chang, *Effect of Fluoride on Nucleotides and Ribonucleic Acid in Germinating Corn Seedling Roots*, 43 PLANT PHYSIOLOGY 669 (1968); Danuta Jachimczak & Bogumila Skotarczak, *The Effect of Fluorine and Lead Ions on the Chromosomes of Human Leucocytes in Vitro*, 19 GENETICA POLONICA 353 (1978); John Emsley et al., *An Unexpectedly Strong Hydrogen Bond: Ab Initio Calculations and Spectroscopic Studies of Amide-Fluoride Systems*, 103 J. AM. CHEM. SOC'Y 24 (1981); John Emsley et al., *The Uracil-Fluoride Interaction: Ab Initio Calculations including Solvation*, 8 J. CHEMICAL SOC'Y CHEMICAL COMMUN. 476 (1982); A.H. Mohamed & M.E. Chandler, *Cytological Effects of Sodium Fluoride on Mice*, 15 FLUORIDE 110 (1982); Toshio Imai et al., *The Effects of Fluoride on Cell Growth of Two Human Cell Lines and on DNA and Protein Synthesis in HeLa Cells*, 52 ACTA PHARMACOLOGICA ET TOXICOLOGICA 8 (1983); Takeki Tsutsui et al., *Cytotoxicity, Chromosome Aberrations and Unscheduled DNA Synthesis in Cultured Human Diploid Fibroblasts Induced by Sodium Fluoride*, 139 MUTATION RES. 193 (1984); Takeki Tsutsui et al., *Induction of Unscheduled DNA Synthesis in Cultured Human Oral Keratinocytes by Sodium Fluoride*, 140 MUTATION RES. 43 (1984); Takeki Tsutsui et al., *Sodium Fluoride-induced Morphological and Neoplastic Transformation, Chromosome Aberrations, Sister Chromatid Exchanges, and Unscheduled DNA Synthesis in Cultured Syrian Hamster Embryo Cells*, 44 CANCER RES. 938 (1984); Carol A. Jones et al., *Sodium Fluoride Promotes Morphological Transformation of Syrian Hamster Embryo Cells*, 9 CARCINOGENESIS 2279 (1988); Marilyn J. Aardema et al., *Sodium Fluoride-induced Chromosome Aberrations in Different Stages of the Cell Cycle: A Proposed Mechanism*, 223 MUTATION RES. 191 (1989); Takeki Tsutsui et al., *Cytotoxicity and Chromosome Aberrations in Normal Human Oral Keratinocytes Induced by Chemical Carcinogens: Comparison of Inter-Individual Variations*, 5 TOXICOLOGY IN VITRO 353 (1991).

22. See e.g., *Environmental Defense Fund v. Environmental Protection Agency*, 548 F.2d 998, 1006 (D.C. Cir. 1976).

Congress, because, if this clause conferred such a general legislative authority, it would render the enumeration of specific legislative powers redundant and pointless.²³

Madison's observation was important because he showed that if Congress had a general legislative authority such, it would be nothing other than a power to provide for the common defense and the general welfare. It would be a power, subject to the limitations inherent and implied in every republican form of government,²⁴ to enact only by laws necessary and proper or, in other words, laws fairly proportioned to and consistent with the common defense and general welfare, in keeping with legal principle and legal tradition.²⁵ Alexander Hamilton made unmistakably clear that a bill of rights, including all essential privileges and immunities of a free people, is always implied, if not expressed, in any republican form of government.²⁶ And every republican form of government, as an outgrowth of the American Revolution, necessarily presupposes the essential truths of the Declaration of Independence, which begins, before all else, with a tribute to the "Laws of Nature and Nature's God."²⁷

So it was that Justice Samuel Chase of the United States Supreme Court, one of the signers of the Declaration of Independence, thus

23. See THE FEDERALIST NO. 41, at 276-77 (Clinton Rossiter ed., 1961). In reaching this conclusion, Madison applied the rule of construction from the common law that clauses dealing with the same general subject or question should be construed together, if possible, to give every distinct provision some useful purpose and to coalesce into a harmonious whole with the others. See THE FEDERALIST NO. 40, at 260 (Clinton Rossiter ed., 1961). The same idea is advanced in the 7th of the Kentucky Resolutions of 1798, authored by Thomas Jefferson. See 4 DEBATES ON THE FEDERAL CONSTITUTION 542 (Elliot ed., Lippencott & Co., Philadelphia) (2d ed. 1859).

24. James Madison emphasized that the government of the Union, like the government of every State, is a republican form of government which has its origin in the people and features distinctive of the American Revolution. See THE FEDERALIST NO. 39, at 240-42 (Clinton Rossiter ed., 1961). The first mature prototype of such a republican form of government, see the Virginia Bill of Rights and Constitution of 1776, reprinted in 9 Hening's Statutes at Large, at 109-19.

25. See THE FEDERALIST NO. 33, at 203-04 (Alexander Hamilton) (Clinton Rossiter ed., 1961); THE FEDERALIST NO. 44, at 285 (James Madison) (Clinton Rossiter ed., 1961). Both Hamilton and Madison agreed that the eighteenth clause of Article I, Section 8, of the United States Constitution, granting Congress the power to enact necessary and proper laws, would have been implied if it had not been expressed. Also, while it allows implied powers, it also imposes implied limits on powers of just legislation. The standard judicial definition of necessary and proper laws is found in *M'Colloch v. Maryland*, 17 U.S. (4 Wheat.) 316, 421 (1819).

26. See THE FEDERALIST NO. 84, at 512-14 (Clinton Rossiter ed., 1961).

27. THE DECLARATION OF INDEPENDENCE para. 1 (U.S. 1776). Sir William Blackstone gave incomparable exposition to the meaning of natural law as the foundation of constitutional government in 1 COMMENTARIES ON THE LAWS OF ENGLAND 38-43 (1765) [hereinafter BLACKSTONE].

expounded in a celebrated case the inherent limitations on general legislative authority under any republican form of government:

The nature, and ends of legislative power will limit the exercise of it. This fundamental principle flows from the very nature of our free Republican governments, that no man should be compelled to do what the laws do not require; nor to refrain from acts which the laws permit. There are acts which the Federal, or State, Legislatures cannot do, without exceeding their authority. There are certain vital principles in our free Republican governments, which will determine and over-rule an apparent and flagrant abuse of legislative power; as to authorize manifest injustice by positive law; or to take away that security for personal liberty, or private property, for the protection whereof the government was established.²⁸

There can be no serious dispute as to the nature of the original idea. In view of the transformations accomplished by the American Revolution, general legislative authority was understood to be the power of enacting necessary and proper laws to provide for the common defense and general welfare, in conformity with natural law and legal tradition. And this idea, fully justiciable, was imposed before the Fourteenth Amendment was ever thought of, by the so-called Guarantee Clause in of the United States Constitution, which demands that in and for every State of the Union there shall be a "Republican Form of Government."²⁹

The term "police power" later appeared as a term of jurisprudence in antebellum litigation which arose under the Guarantee Clause, used to describe the legislative powers of the several States to enact regulations of domestic life.³⁰ The Guarantee Clause largely disappeared as a restraint upon the several States as a consequence of misunderstanding the interesting old case of *Luther v. Borden*.³¹ Many generations of judges and lawyers have been deeply confused about it.

In 1842, there was a civil war between two state governments in Rhode Island, each claiming to be lawful.³² Both the majority and the dissent agreed that the court could not resolve this question³³, which was said to be nonjusticiable, because of the enormous

28. *Calder v. Bull*, 3 U.S. (3 Dal.) 386, 388 (1798).

29. U.S. CONST. art IV, § 4.

30. See *Thurlow v. Massachusetts*, 46 U.S. (5 How.) 504, 582-83 (1847).

31. 48 U.S. (7 How.) 1 (1849).

32. See *id.* 34-38, 48-57.

33. See *id.* at 39-47, 51-58.

practical difficulties involved. Thus began the doctrine of political questions which says that a question is nonjusticiable and so cannot be judicially decided if, in the circumstances, a practical remedy cannot be given by the courts if there are no objective legal standards upon which a judicial decision can be made, or if the question is plainly referred by fundamental law to the political organs of government or society.³⁴ Nothing could ever be so likely to injure the dignity or reputation of the bench than failure of judges to honor these inherent limits to their power.

But there was another important question in the case which most students have overlooked. This question was whether the charter government of Rhode Island, assumed legitimate, could impose martial law during the unrest which appears in retrospect to have been remarkably trivial. This question was decided on the merits.³⁵ The majority held that the charter government could impose martial law, but there was a strong dissent, mainly based on the Petition of Right.³⁶

In any event, there has never been any reason for saying, as has sometimes been held,³⁷ that any constitutional question arising under the Guarantee Clause is *per se* nonjusticiable. And a number of courts have occasionally recognized the Guarantee Clause as an appropriate basis of judicial decision,³⁸ as clearly suggested by Justice Samuel Chase when John Adams was President. During the twentieth century, the Guarantee Clause has been a sleeping giant of the United States Constitution, yet there is no reason why, if the need becomes urgent in future years, the giant cannot be awakened and put to good use.

The Fourteenth Amendment followed the American Civil War and has since been the main basis in the United States Constitution for judicial decisions restraining the exercise of police power by the several States. There are some well-kept secrets about the Fourteenth Amendment, which are highly pertinent to the question of police power, and these may conceivably become more widely understood or even become legal orthodoxy in the twenty-first century.

34. See *Baker v. Carr*, 369 U.S. 186, 208-37 (1962).

35. See *Luther v. Borden*, 48 U.S. (7 How.) at 46, 58-88.

36. 3 Car. I, ch. 1 (1628).

37. See, e.g., *Taylor v. Beckham*, 178 U.S. 548, 578-79 (1900); *Pacific States Tel. & Tel. Co. v. Oregon*, 223 U.S. 118, 142-53 (1912).

38. See, e.g., *Harrington v. Plainview*, 6 N.W. 777 (Minn. 1880).

In the *Slaughter House Cases*,³⁹ the majority spoke the dark language of police power and upheld a Louisiana statute which required all slaughtering of animals as food for consumption in and around New Orleans to be done in facilities maintained under the auspices of a certain corporation.⁴⁰ The holding rests mainly on a notoriously unconvincing rationalization to accommodate an unwillingness to face the full impact of the Fourteenth Amendment.

The first well-kept secret about the Fourteenth Amendment is found in the four dissenting votes to the *Slaughter House Cases*, which rest mainly on the very capable and powerful opinions of Justice Stephen Field⁴¹ and Justice Joseph Bradley.⁴² Section 1 of the Fourteenth Amendment restrains the several States from abridging the privileges and immunities of citizens of the United States. Most certainly these dissenters were right in maintaining that this clause serves to incorporate all guarantees of civil liberty found in the United States Constitution as further restraints on the several States, including the First through Ninth Amendments.⁴³ And in light of legal tradition, they were right in maintaining that the Fourteenth Amendment, by incorporating the Ninth Amendment, imposes the old Statute of Monopolies⁴⁴ upon the several States.

Another well-kept secret about the Fourteenth Amendment, which may be unpleasant to some people yet ever so true, is that the article was never lawfully adopted,⁴⁵ mainly because it was proposed by a Congress which unlawfully excluded representatives and senators from ten States for having had the temerity of holding views not to the liking of an impassioned and factious majority.⁴⁶ Moreover, adoption was unlawful because ratification by those ten States, essential to adoption, was coerced by keeping them under

39. 83 U.S. (16 Wall.) 36 (1873).

40. *See id.* at 58-82.

41. *See id.* at 83-111.

42. *See id.* at 111-24.

43. It is impossible to attribute any other cogent meaning to this clause in light of *Corfield v. Coryell*, 6 F. Cas. 546 (C.C.E.D. Pa. 1823) (No. 3230), and *Barron v. Baltimore*, 32 U.S. (7 Pet.) 243 (1833).

44. *See* 21 Jac., ch. 3 (1623). The Statute of Monopolies expressly ordained that monopolies granted by the Crown were "contrary to the ancient and fundamental laws of the realm, and are utterly void." *Id.* at § 1. The statute created an express proviso allowing patents of invention for terms of fourteen years. *See id.* at § 6. Royal grants of monopoly had previously been declared unlawful in the *Case of Monopolies*, 11 Coke 84a (K.B. 1603).

45. This unhappy truth has been subject to protest from the most respectable quarters. *See, e.g., Dyett v. Turner*, 439 P.2d 266 (Utah 1968).

46. Such exclusion was unconstitutional for reasons then clearly understood and long since judicially settled. *See, e.g., Powell v. McCormick*, 395 U.S. 486 (1969).

martial law until they ratified,⁴⁷ contrary to principles already known and adjudicated to be unconstitutional.⁴⁸ Because time is a wonderful solvent of truth, we may anticipate that in the twenty-first century the Fourteenth Amendment may well be stricken from the United States Constitution.

The final well-kept secret about the Fourteenth Amendment is this: if and when it is finally acknowledged that the Fourteenth Amendment was never lawfully adopted, we shall not be deprived of means, under the fundamental law of the Union, to restrain the several States from acts of invidious discrimination or other forms of injustice. The reason is that everything worthwhile so far done in the name of the Fourteenth Amendment, and much more besides, can also be done, upon a more enlightened view of the American Revolution, in the name of the Guarantee Clause.⁴⁹ *E pluribus unum. Annuit coeptis novus ordo seclorum.*

III. NATURAL LAW JURISPRUDENCE

Between now and the hopeful future of clearer vision, we can use principles common both to the Guarantee Clause or the Fourteenth Amendment as a constitutional restraint on the "police power" of the several States, and we may be guided by judicial decisions rendered under either provision. And for this purpose, especially as it relates to artificial fluoridation of public water supplies, it is important to understand what has been done right, what has been done wrong, and why there has consequently been both progress and deterioration in American jurisprudence.

We first need to understand what has been done wrong and learn from it. With this objective in mind, we need to pay attention to Justice Hugo Black. During his tenure on the United States Supreme Court, Justice Black managed to sow more confusion, yet with important kernels of truth and distinguished erudition, than almost

47. The Reconstruction Act was passed over a veto based on constitutional grounds. See 14 Stat. 428 (1867). The unanswerable veto message of President Andrew Johnson is reprinted in, 1 DOCUMENTS OF AMERICAN HISTORY 481-85 (Henry Steele Commager ed., 9th ed. 1973).

48. Although the Reconstruction Act imposed martial law under circumstances disallowed in *Ex Parte Milligan*, 71 U.S. (4 Wall.) 2 (1866), the constitutional infraction was allowed by systematic evasion of the question by the judiciary. See generally *Texas v. White*, 74 U.S. (7 Wall.) 700 (1869); *Georgia v. Stanton*, 73 U.S. (6 Wall.) 50 (1868); *Ex Parte McCordle*, 73 U.S. (6 Wall.) 318 (1868); *Ex Parte Yerger*, 75 U.S. (8 Wall.) 85 (1868); *Mississippi v. Johnson*, 71 U.S. (4 Wall.) 475 (1867).

49. The possibilities for this development have already been considered in two articles by Arthur E. Bonfield, *Baker v. Carr: New Light on the Constitutional Guarantee of Republican Government*, 50 CAL. L. REV. 245 (1962) and *The Guarantee Clause of Article IV, Section 4: A Study in Constitutional Desuetude*, 46 MINN. L. REV. 513 (1962).

any judicial figure in the world during the twentieth century. His mistakes have pronounced characteristics which are particularly instructive when viewed in retrospect.

His trademark position, stated in his famous dissent in *Adamson v. California*,⁵⁰ was that the Fourteenth Amendment incorporates the Federal Bill of Rights, including the First through Eighth Amendments.⁵¹ But, if the Fourteenth Amendment incorporates the Federal Bill of Rights, it necessarily also incorporates the Ninth Amendment which says that the enumeration of certain rights "shall not be construed to deny or disparage others retained by the people."⁵² Why no mention of the Ninth Amendment?

Throughout his dissent, Justice Black fairly radiated hostility against the ancient and venerable idea of natural law,⁵³ which he plainly did not understand either as a force shaping legal tradition or as a category of jurisprudence.⁵⁴ He acted as if the Ninth Amendment did not exist, because this article of fundamental law, construed in light of constitutional history, cannot possibly exclude those "certain unalienable Rights" with which all human beings are "endowed by their Creator" under the "Laws of Nature and Nature's God."⁵⁵

Justice Black carried his hostility to natural law even further in his majority opinion in *Ferguson v. Skrupa*.⁵⁶ At issue in that case was a Kansas statute prohibiting any person from engaging in the business of debt adjusting, except as incident to the authorized practice of law.⁵⁷ At the time, there was a venerable precedent which held that, under the 14th Amendment, no state has constitutional authority to prohibit a useful business which is not inherently immoral or

50. 332 U.S. 46, 68-123 (1947).

51. The historical evidence supporting this thesis is found in the appendix to Justice Black's opinion. See *id.* at 92-123.

52. This provision was intended to meet the objection of Alexander Hamilton in THE FEDERALIST NO. 84, at 513-14 (Clinton Rossiter ed., 1961), that an enumeration of rights was dangerous, because it might be used as a false pretext to claim power for seizing rights not mentioned. See the observations of James Madison in the United States House of Representatives on June 8, 1789, recorded in 1 ANNALS OF CONGRESS 439-40 (Gales & Seaton 1834).

53. See *Adamson v. California*, 332 U.S. at 79-80, 91.

54. Justice Black was plainly not aware of such distinguished works on natural law as HEINRICH A. ROMMEN, *DIE EWIGE WIEDERKEHR DES NATÜRRECHTS* (1936), translated as THE NATURAL LAW (Thomas R. Hanley trans., 1955). Hanley's introduction movingly relates how Rommen as a lawyer in Nazi Germany discovered the reality of natural law and was led to reject legal positivism in resisting Hitler's violations of human rights. See *id.* at xi-xxxviii.

55. THE DECLARATION OF INDEPENDENCE para. 1, 2 (U.S. 1776). This language obviously corresponds to those "certain inherent rights" which are mentioned in the first article of the Virginia Bill of Rights of 1776, reprinted in 9 Hening's Statutes at Large, at 109.

56. 372 U.S. 726 (1963).

57. See *id.* at 727.

dangerous to public welfare.⁵⁸ Black flippantly overruled this old case with the remark, "Whether the legislature takes for its textbook Adam Smith, Herbert Spencer, Lord Keynes, or some other is no concern of ours."⁵⁹

Black's attitude was founded upon one of the most unfortunate falsehoods ever to pollute American jurisprudence. He assumed, out of ignorance, that cases like *Lochner v. New York*,⁶⁰ were founded on political prejudice, not legal standards. In *Lochner*, the court held that a law limiting the right of bakers to contract for their hours of work was unconstitutional.⁶¹ No reason was even suggested on the record why bakers should not enjoy such discretion, or why they needed the protection of the law, as might have been true if, say, it had been shown that the bakers are typically in an uneven bargaining position in dealing with their employers. If such a showing had been at least attempted, as might well have been easily done, the statute would certainly have been upheld.⁶²

It is true that the freedom to contract, cited as the justification for holding the statute unconstitutional, came from natural law jurisprudence. But the theory was not woven out of thin air. It came from venerable and historic roots, ultimately the decision of Lord Mansfield in *Sommerset's Case*⁶³ which held that, because slavery runs against natural law, it could be sustained only by acts of Parliament,

58. See *Adams v. Tanner*, 244 U.S. 590 (1917). As with many other cases like it, this case turned on the clause of the Fourteenth Amendment which forbids any state from denying life, liberty, or property without due process of law. The clause is ultimately traceable to the 39th Article of the Magna Carta of King John. It was probably added to the Fourteenth Amendment to cure the unfortunate holding of the majority in *Satterlee v. Matthewson*, 27 U.S. (2 Pet.) 380 (1829), and drew inspiration from cases such as *University of North Carolina v. Fox*, 5 N.C. (1 Mur.) 83 (1805).

59. 372 U.S. at 732. This case echoed of the thoughtless satyrism of Oliver Wendell Holmes in *Lochner v. New York*, 198 U.S. 45, 75 (1905) ("The Fourteenth Amendment does not enact Mr. Herbert Spencer's Social Statics"). Under this theory, we should be equally indifferent as to whether the legislature of a State were to take guidance from Maximilien de Robespierre, Vladimir Lenin, Adolf Hitler, Joseph Stalin, Mao Tse Tung, or Pol Pot.

60. 198 U.S. 45 (1905).

61. See *id.* at 64-65.

62. Pope Leo XIII issued the encyclical *Rerum Novarum* (1891), which was one of the greatest statements on natural law in history. He expounded rights of labor and the duty of governments to enact legislation protecting labor from unjust exploitation. It was on this basis that legislation protecting labor from unjust exploitation was repeatedly approved as constitutional in natural law jurisprudence, whenever a plausible justification of legislative judgment was made to appear on the record. See, e.g., *Bunting v. Oregon*, 243 U.S. 426 (1917); *Muller v. Oregon*, 208 U.S. 412 (1908); *Holden v. Hardy*, 169 U.S. 366 (1898).

63. 20 How. St. Tr. 1, 82 (K.B. 1771).

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63. 20 How. St. Tr. 1, 82 (K.B. 1771).

and all statutes allowing it had to be strictly construed so as to make a slave free the moment he set foot on the free soil of England.⁶⁴

This idea was, of course, adopted and expanded by the Thirteenth Amendment. It follows, by legal inference, that nobody in the United States may be denied a liberal right to earn a livelihood or to engage in business as he or she sees fit. Thus, it has been held under the Fourteenth Amendment, that unless a statute limiting the right of a citizen to contract freely can be plausibly justified, it is unconstitutional.⁶⁵ The idea does not embrace irresponsible freedom and it does not outlaw legislation to prevent unjust exploitation of labor or activity harmful to the public good. The right is confirmed by natural law and legal tradition and is suited to the circumstances of a free people. There has always been just cause to apply this notion with judicious caution,⁶⁶ but there never has been any reason to reject or overrule it altogether.⁶⁷

Black took his extremism to the *ne plus ultra* in his bitter dissent in *Griswold v. Connecticut*.⁶⁸ Complaining that natural law is mysterious and uncertain and that the Ninth Amendment has only nominal but no substantive meaning, Black insisted that even a statute intruding into the sexual intimacy of a husband and wife, disallowing them to be instructed by their physician on artificial methods of birth control, could not be struck down as unconstitutional.⁶⁹ Fortunately, his fellow justices had no trouble in understanding privacy as

64. This principle originated in the policy of the common law which favored liberty, and thus nudged villeinage into extinction. See, e.g., *Pigg v. Caley*, Noy 27 (K.B. 1618). Strict construction of laws allowing slavery was adopted by judges of the old South, and many slaves were freed because of it. See, e.g., *Murray v. M'Carty*, 16 Va. (2 Mun.) 393 (1811). It was also applied by the circuit court of Missouri in granting Dred Scott and his family their freedom, and was the main basis of the dissent of Justice Benjamin Curtis in *Dred Scott v. Sandford*, 60 U.S. (19 How.) 391, 602-603 (1857).

65. See *Allgeyer v. Louisiana*, 165 U.S. 578 (1897).

66. So as to avoid unfortunate decisions like *Coppage v. Kansas*, 236 U.S. 1 (1915), which was simply a mistake. No apology can be offered for it in any school of thought.

67. *Nebbia v. New York*, 291 U.S. 502 (1934), is sometimes cited as the beginning of the end of natural law jurisprudence in the field of economic regulation, but the case is better understood as a just extension of *Munn v. Illinois*, 94 U.S. 113 (1877), in light of pressing economic circumstances not existing at the time of *Fairmont Creamery Co. v. Minnesota*, 274 U.S. 1 (1926). Likewise, *West Coast Hotel Co. v. Parrish*, 300 U.S. 379 (1937), is often cited as the definitive end of natural law jurisprudence in the field of economic regulation. Yet in *Parrish*, the majority disregarded the intended meaning of the Nineteenth Amendment as expounded in *Adkins v. Children's Hospital of the District of Columbia*, 261 U.S. 525, 552-53 (1923), and later revived in *Frontiero v. Richardson*, 411 U.S. 677, 686-88 (1977). *Parrish* allowed a kind of sex discrimination which would never be allowed today and may be considered virtually overruled.

68. 381 U.S. 479, 507-27 (1965).

69. See *id.* at 523-25.

sounder landmark which can be used with greater wisdom and confidence in future years.

IV. HEALTH FREEDOM

One of the most distinguished civil liberties decisions of the twentieth century, never overruled and often cited,⁷² rests on the opinion of Justice James McReynolds in *Meyer v. Nebraska*.⁷³ Citing the duty of government to promote education, founded on the Northwest Ordinance, McReynolds struck down as unconstitutional under the Fourteenth Amendment a law prohibiting the teaching of German to children in the primary grades of public schools in Nebraska. His general formula is particularly worthy of notice:

While this court has not attempted to define the exactness the liberty thus guaranteed, the term has received much consideration, and some of the included things have been definitively stated. Without doubt, it denotes not merely freedom from bodily restraint, but also the right of the individual to contract, to engage in any of the common occupations in life, to acquire useful knowledge, to marry, to establish a home and bring up children, to worship God according to the dictates of conscience, and, generally, to enjoy privileges long recognized at common law as essential to the orderly pursuit of happiness by free men.⁷⁴

It is noteworthy that Sir William Blackstone mentioned the "preservation of man's health from such practices as may prejudice or annoy it" not as a legislative power, but as among "absolute rights of individuals,"⁷⁵ — in other words, as among "those privileges long recognized at common law as essential to the orderly pursuit of happiness by free men."⁷⁶

Therefore, it is clear enough that there are natural rights protected by fundamental law, even if not constitutionally enumerated. As there is such a natural right to marry and have children, to seek knowledge, to enjoy personal privacy, and to earn a livelihood by honest work of choice, subject only to such regulation as may be reasonably needed to protect the rights of others and the common good, so too there is a domain of personal freedom, which limits the

72. See, e.g., *Griswold v. Connecticut*, 381 U.S. at 481-82, 495, 502.

73. 261 U.S. 390 (1923).

74. See *id.* at 399-400.

75. BLACKSTONE, *supra* note 27, at 134.

76. 261 U.S. at 400.

"police power" of a State in regulating health. It is an area given some but not full judicial development in the twentieth century.

Two classic cases stand out like beacons, the first being *Jacobson v. Massachusetts*,⁷⁷ in which a citizen challenged a statute compelling small pox vaccinations to counteract a pending epidemic of deadly disease. The act of the legislature was upheld under the Fourteenth Amendment. The holding is understandable, because the statute addressed a public danger, and failure to comply might have tangibly increased the chances that an offender might become a carrier of disease which thereby could infect others. Public emergency has always justified intrusions, even upon incomplete knowledge, which normal situations will not.

Of much interest in this case is the discussion of the fact that, while the general belief of the legislature on the need for smallpox vaccinations was supported by respectable medical authority, there was nevertheless responsible dissent within the medical profession over the efficacy and in some degree even of the safety of this particular measure. In *Jacobson*, the court reasoned "[t]he possibility that the belief [favoring smallpox vaccinations] may be wrong, and that science may yet show it to be wrong is not conclusive; for the legislature has the right to pass laws which, according to [reasonable belief] are adapted to prevent the spread of contagious diseases."⁷⁸

No less of interest is an exception to the general principle of the judgment. The court plainly said that the statute could never be interpreted to compel a vaccination where it could be shown "with reasonable certainty" that application of the statute to an objecting citizen "would seriously impair his health or probably cause his death."⁷⁹ This observation was added as an essential feature of the *ratio decidendi* to avoid misinterpretation.

The court did not define what exactly it meant in saying that a statutory regulation of public health may not be extended to situations in which serious impairment of personal health is shown with "reasonable certainty." But this characteristic phrase has long been a term of art in the law of damages. It has long been used to

77. 197 U.S. 11 (1905).

78. *Id.* at 35. Language has been substituted in brackets for the phrase "the common belief of the people" in the opinion, because the obvious intent of the court was that the belief of the legislature acting on behalf of the people must at least be reasonable in view of available knowledge and evidence. The court said, "if a statute purporting to have been enacted to protect the public health, the public morals, or the public safety, has no real or substantial relation to those objects," then it is the duty of the judiciary to intervene and declare such statute unconstitutional. *Id.* at 31.

79. *Id.* at 39.

describe the legal standard of proving an injury in civil proceedings: while damages cannot be based on speculation or guess, it will be enough to show the approximate degree of harm by fair preponderance of the evidence adduced in a judicial hearing.⁸⁰ And, in such case, injury can be proved by the opinions of experts who can demonstrate that they are well informed on the subject investigated.⁸¹

The other outstanding case on generic principles of health freedom is *Toronto v. Forest Hill*,⁸² in which the majority opinion was written by Justice Ivan Rand, who was probably the most eminent jurist on the Supreme Court of Canada, in any event one of the finest natural law judges in the world during the twentieth century.⁸³ This case arose under the British North America Act of 1867, before it was possible, except on a very limited basis,⁸⁴ for the judiciary of Canada to strike down acts of the dominion Parliament or of the provincial Legislatures as unconstitutional and thus null and void.⁸⁵ The judiciary of Canada was then obliged to protect civil liberties by strict construction of statutes, as far as possible, so as to avoid collision with natural law and legal tradition.⁸⁶ It was by using such conservative

80. See, e.g., *Bigelow v. RKO Radio Pictures Inc.*, 327 U.S. 251 (1946); *Story Parchment Co. v. Paterson Parchment Paper Co.*, 282 U.S. 555 (1930); *Eastman Kodak Co. v. Southern Photo Material Co.*, 273 U.S. 359 (1927).

81. See, e.g., *Julian Petroleum Corp. v. Courtney Petroleum Co.*, 22 F.2d 360, 362 (9th Cir. 1927).

82. [1957] 9 D.L.R. 2d 113 (Can.).

83. See, e.g., Michael Schneiderman, *The Positivism of Hugo Black v. The Natural Law of Ivan Rand: A Study in Contrasting Judicial Philosophies*, 33 SASKATCHEWAN LAW REV. 267 (1968). Another great natural law jurist in Canada during the twentieth century was Chief Judge Jules Deschenes of the Superior Court of Quebec. See, e.g., *Nissan Auto. Co. v. Pelletier*, 77 D.L.R. 3d 646 (Que. 1976).

84. Mainly where statutes were enacted contrary to the organic provisions of the British North America Act of 1867, as held by the British Privy Council in *In re Initiative and Referendum Act* [1919] App.Cas. 935, and the Supreme Court of Canada in *Saumer v. Quebec*, [1953] 4 D.L.R. 641 (Can.).

85. The situation has since changed beginning with the Canadian Bill of Rights of 1960, an organic statute of the dominion Parliament, which unlike the English Bill of Rights of 1689, was more than a venerable guide for the interpretation of statutes. In *Queen v. Drybones* [1970] 9 D.L.R. 3d 473 (Can.), the Canadian Bill of Rights of 1960 was held to be a statutory directive to restrain federal laws from operation. Later came the Canadian Charter of Rights and Freedoms consisting of sections 1 through 35 of the Constitution Act of 1982, which restrains the federal and provincial governments, and cannot be repealed by legislative act. Even so, section 33 of the Constitution Act of 1982 concedes to legislative power the prerogative of making statutes operable for five-year intervals, notwithstanding important provisions of the Canadian Charter. The Constitution Act of 1982 is part of the Canada Act of 1982, an organic statute of the British Parliament which renounced the last vestiges of imperial control over Canada.

86. Lord Coke held in *Dr. Bonham's Case*, 8 Coke 114a (C.P. 1610), that the courts of common law declare acts of parliament null and void. This doctrine was overthrown on the weight of the principle that the Commons, Lords, and King in Parliament are omnipotent and sovereign, and that, therefore, the judiciary cannot declare an act of Parliament null and void. Even so, the judges can and must construe acts in keeping with the principle that the King can

yet effective principles that Justice Rand became distinguished as a civil libertarian on the bench.

In *Forest Hill*, a provincial law allowed municipal corporations to treat public water supplies so as to make the vended water "pure and wholesome."⁸⁷ Justice Rand construed this statute strictly, so as to disallow fluoridation. He protested,

But it is not to promote the ordinary use of water as a physical requisite for the body that fluoridation is proposed. That process has a distinct and different purpose; it is not a means to an end of wholesome water for water's function but to an end of a special health purpose for which water supply is made use of as a means.⁸⁸

Similar language appears in the concurring opinion of Justice Cartwright, regarding the municipal by-law to initiate fluoridation then in question:

In pith and substance the by-law relates not to the provision of a water supply but to the compulsory preventative medication of the inhabitants of the area. In my opinion, the words of the statutory provisions on which the appellant relies do not confer upon the council the power to make by-laws in relation to matters of this sort.⁸⁹

Jacobson and *Forest Hill* expound complementary principles of natural law jurisprudence, and thereby supply a cogent idea of health freedom which is inherent in the respected constitutional formulation expressed in *Meyer v. Nebraska*.⁹⁰

Under the Guarantee Clause, the Ninth Amendment, and the Fourteenth Amendment, understood in light of natural law and legal tradition, "police power" to regulate public health includes discretion to compel submission of citizens to medical intervention, but only if three necessary conditions are met. First, legislative judgment underlying the statute may discount responsible professional dissent,

do no wrong, and thus that all acts of Parliament must be construed, if possible, in keeping with natural law and legal tradition. The judges should do so, even if they must read statutes *quoad hoc* or contrary to their literal meaning in unusual situations. See, e.g., BLACKSTONE, *supra* note 27, at 91, 160, 246.

87. *Forest Hill*, 9 D.L.R. 2d at 114-15.

88. *Id.* at 118. The same distinction appears in the Safe Drinking Water Act, 42 U.S.C. § 300g-1(b)(11), which states, "No national primary drinking water regulation may require the addition of any substance for preventative health care purposes unrelated to contamination of drinking water." This provision was intended by Congress to prohibit the use of the Safe Drinking Water Act as a means of imposing artificial fluoridation of public water supplies throughout the United States.

89. *Id.* at 124.

90. 261 U.S. 390 (1923).

yet must at least rest upon reasonable medical or scientific evidence. Second, it must be fairly justified by grave cause or public emergency, such as the need to prevent the spread of a contagious disease. Third, the intervention prescribed cannot be imposed whenever protesting citizens are able to prove, by a fair preponderance of the evidence, a tangible danger of serious injury to their health. But the legislative power cannot otherwise impose compulsory medication on protesting citizens. This much is the ideal of natural law jurisprudence which is inseparable from the intended meaning of the United States Constitution.

V. THE KEY DECISIONS SUSTAINING FLUORIDATION

It is not our purpose to provide a general review of all judicial decisions that have touched upon the constitutionality of imposing fluoridation on the general public.⁹¹ Suffice it to say that the great majority of cases sustain it, we think wrongly, but there can be no doubt about the clear trend of American jurisprudence.

Our objective here is to note highly important developments in the last twenty-five years, which strenuous efforts have been made to camouflage behind smiling propaganda orchestrated by the ADA and the USPHS to promote fluoridation, as if all were well. In fact an end to this episode of public health malpractice is foreseeable. If we consider scientific and legal revolutions of the past, say from the discovery of the true cause of puerperal fever by Dr. Ignaz Semmelweiss until his eventual posthumous vindication, or in the development of freedom of the press from the founding of the Star Chamber to the adoption of the First Amendment, we should not be astonished to see the passing of considerable time in the rise and fall of fluoridation, and not a little confusion along the way.

Among all others, the most distinguished judgment sustaining the constitutionality of mandatory fluoridation of public water supplies has always been, and still is, *Paduano v. City of New York*,⁹² which arose upon a suit brought in 1965 to enjoin the practice in New York City.⁹³ At that time the clear weight of available medical and scientific evidence, then respectable but long since shown to be

91. A recent article reviewing many such cases is by Douglas Balog, *Fluoridation of Public Water Systems: Valid Exercise of State Police Power of Constitutional Violation?*, 14 PACE ENVTL. L. REV. 645 (1997).

92. 257 N.Y.S. 2d 531 (S.Ct. N.Y. County 1965), *aff'd* 24 App. Div. 2d 437, 260 N.Y. S. 2d 831 (1965), *aff'd* 17 N. Y. 2d 875, 271 N. Y. S. 2d 305 (1966), *cert. denied* 385 U.S. 1026 (1967).

93. *See id.* at 533.

unfounded,⁹⁴ suggested that fluoridation was effective in reducing tooth decay in children.⁹⁵ Evidence of potential danger then existed,⁹⁶ but it was little known, in an undeveloped state, and effectively concealed by ADA-USPHS misinformation.⁹⁷ Most physicians and dentists then believed that fluoridation was beneficial and safe. It is fair to say that most available evidence -at least what could be easily orchestrated into a courtroom appearance of the most available evidence -then suggested that fluoridation was beneficial and safe.

True enough, then available evidence suggested the need for caution among the wise. But there were not many in those days who had good credentials, independent means, leisure time for deep study, the persuasiveness to expose the slick sales pitches of ADA-USPHS spokesmen, the capacity to survive assaults on their careers and reputations mounted by fluoridation promoters,⁹⁸ and wisdom besides.

It is wrong to justify fluoridation by reference to *Jacobson*, because fluoridation, unlike small pox vaccinations, does not address a contagious disease, but it is at least understandable that the Supreme Court of New York should have cited it as persuasive legal authority.⁹⁹ The court said:

The question of the desirability of fluoridation is immaterial. In the face of the overwhelming precedents previously cited, and in accordance with general principles of stare decisis, this court sitting at Special Term, feels constrained to deny plaintiffs' application for a temporary injunction and to grant defendants' motion for a dismissal of the complaint. *Until the scientific evidence as to the deleterious effects of fluoridation reaches beyond the purely speculative state now existing, decisional law mandates the holding that the controversy should remain within the realm of the legislative and executive branches of government. While the courts do not have a right to impose fluoridation upon anyone, judicial restraint requires us to adhere to the uniform decisions holding that the executive and legislative branches of government do -at least until some proof is*

94. See Kalsbeek & Verrips, *supra* note 8; Ziegelbecker, *supra* note 10; Kumer, *supra* note 8; Imai, *supra* note 9; Colquhoun, *supra* note 11; Yiamouyiannis, *supra* note 12, and accompanying text.

95. See, e.g., Hilliboe et al., *supra* note 4, at 314-24.

96. See Taylor, *supra* note 16, and accompanying text.

97. See, e.g., Hilliboe et al., *supra* note 4; HARRIS, *supra* note 18, and accompanying text.

98. Literally volumes could be written on the notorious and ruthless tactics of fluoridation promoters seeking to silence all credible opposition. A sober and factual introduction to this subject of political intrigue can be found in WALDBOTT, ET AL., *supra* note 1, at 258-352.

99. Paduano v. New York, 257 N.Y.S. 2d 531, 539 (S. Ct. N.Y. County 1965).

adduced that fluoridation has harmful side effects and therefore is not in the interests of the community.¹⁰⁰

The court obviously had in mind the qualifying dictum in *Jacobson* that a public health regulation, obliging a citizen to accept a medical remedy, cannot be extended to a situation in which it is shown with reasonable certainty, or by a fair preponderance of the evidence exceeding speculation or guess, that the remedy will impose a danger of serious injury to the personal health of protesting citizens. Note clearly what the court did not say, should not have said, and, in light of its reliance on *Jacobson*, cannot be interpreted to have said that such danger or injury must be proven by evidence so powerful as to eliminate all reasonable controversy on the subject. Such a burden of proof is legally impossible on any question of public health, nor does it comport with public justice or safety, nor does it have any legitimate basis in legal authority.

Another key judgment sustaining imposed fluoridation merits passing notice because it concerns legal ideals of the type suggested by the natural law jurisprudence of Ivan Rand. In *State Board of Health v. Brainerd*,¹⁰¹ a mandatory fluoridation law was applied to a community which protested as a whole body politic in a special referendum¹⁰² by a vote of 9 to 1 against implementing the law, and by a vote of 5 to 1 authorizing the city fathers to sit as a convention which met and declared the statute unconstitutional.

The state board of health sued the municipal government which pleaded the express and formal protest of the residents and voters of the city, the want of a public emergency occasioned by a pending epidemic of contagious disease, the existence of a responsible medical and scientific controversy over the effectiveness and safety of fluoridation, the availability of fluoride to persons desiring it by less intrusive means, and, therefore, the invasion of a natural right of the people, protected by fundamental law under these circumstances, to enjoy freedom of choice in maintaining personal health.¹⁰³ The Minnesota Supreme Court upheld the constitutionality of the mandatory fluoridation law, and sustained the writ of mandamus

100. *Id.* at 542 (emphasis added).

101. 241 N.W.2d 624, 626 (Minn. 1976), *appeal dismissed* 429 U.S. 803 (1976).

102. See *State Board of Health v. City of Brainerd*, No. 38183, Respondents' Answer, part VII, plea in avoidance filed Oct. 31, 1974 (Crow Wing County District Court, Minn.). Judge John Alexander Jameson expressed his warm approbation of such citizen assemblies in his classic *TREATISE ON CONSTITUTIONAL CONVENTIONS* 4-5 (4th ed. 1887, reprint 1972).

103. See *City of Brainerd*, Respondent's Answer, part VIII, plea in avoidance and demurrer, filed Oct. 31, 1974.

ordering city officers to implement the statute.¹⁰⁴ But there was a compelling dissent that speaks to the future.¹⁰⁵

If it can be established "with reasonable certainty" that fluoridation is dangerous to human health, and has caused massive injury to the health of the American people, two very important legal consequences should ultimately follow: (1) the standard of unconstitutionality set forth in *Jacobson* and *Paduano* will have been met, and fluoridation will be unlawful throughout the United States; and (2) the wisdom of a broader constitutional principle of health freedom, envisioned by the majority in *Forest Hill* and the dissent in *Brainerd*, will then be evident, and its eventual judicial recognition as a blessing of liberty may be anticipated for our children, grandchildren, and great grandchildren.

VI. THE EPIDEMIOLOGICAL EVIDENCE

The question now to be addressed is whether, in keeping with *Jacobson* and *Paduano*, it can be proved with "reasonable certainty" in judicial proceedings that fluoridation is dangerous to public health by causing cancer and other ailments in man. In assessing trends in human cancer, we have two main sources of information which can be used as evidence.

Laboratory studies enable us to view a disease at the molecular and cellular levels, and to consider reactions in living plants, insects and animals. The advantage of laboratory studies is that precise experimental conditions can be designed and implemented to control for known and unknown variables, which is critical in the identification of causal operations in the empirical sciences.¹⁰⁶ Whatever legitimate doubt may once have been voiced on the subject, it is now abundantly clear that a significant body of laboratory research reveals carcinogenic potential in fluoride artificially introduced in water at 1.0 ppm.¹⁰⁷

The disadvantage of laboratory studies is that some caution is required in extrapolating results to human beings, and here is where

104. See *Brainerd*, 241 N.W.2d at 629-34.

105. See *id.* at 634-35.

106. Sir Francis Bacon expounded this demand of inductive logic in the third, fourteenth, nineteenth, twenty-second, eighty-second, and ninety-ninth aphorisms in Book I of *Novum Organum*. The meaning of these aphorisms is discussed in 3 COPELSTON, A HISTORY OF PHILOSOPHY, pt. II, 112-22 (1963) [hereinafter COPELSTON].

107. See, e.g., Taylor, *supra* note 16; Taylor & Taylor, *supra* note 20; sources cited *supra* note 21.

epidemiology comes into the picture. Epidemiology is the branch of medicine which studies the diseases of man in his actual environment. If the controls in epidemiological surveys are not as precise, the results are more pertinent to human experience. Therefore, both laboratory studies and epidemiological surveys can profitably be considered together, and, when parallels between them become striking, causal relationships between agents in the environment and human disease can be more readily identified and explained.

Hence the question: Has the carcinogenic potential of fluoride observed in laboratory studies been reflected in human experience? The answer, based on very extensive epidemiological data, is certainly in the affirmative.¹⁰⁸ This fact removes the speculative character of objections previously expressed by physicians and other learned persons when the world first hailed fluoride as a wonder of modern science.

The leader in gathering pertinent epidemiological data and organizing it in a usable form was Dr. Dean Burk, who retired in 1974 as the head of the cytochemistry section of the National Cancer Institute (NCI) of the United States.¹⁰⁹ In his time, he was one of the most famous cancer research scientists in the world. He was well read, highly cultured, disarmingly humble, and had a delicious sense of humor. But standing out above every other trait was his ability to view a problem of empirical observation with clear insight and to give reality, as he put in conversation with those who knew him, "the simplest rational explanation."¹¹⁰

108. The most important versions of the epidemiological data here in question, including reference to related laboratory studies, and conventional adjustments for age, race, and sex, are the following: Dean Burk & John Yiamouyiannis, *Fluoridation and Cancer: Age Dependence of Cancer Mortality Related to Artificial Fluoridation*, 10 FLUORIDE 123 (1977) [hereinafter Burk & Yiamouyiannis]; Dean Burk and J. R. Graham, *Lord Jauncey and Justice Flaherty: Opposing Views of the Fluoridation-Cancer Link*, 17 FLUORIDE 63 (1984) [hereinafter Burk & Graham]; Pierre Morin et al., *Les fluorures versus le cancer et les maladies congénitales: l'image globale*, GOUVERNEMENT DU QUEBEC, MINISTÈRE DES AFFAIRES SOCIALES (1984); Pierre Morin et al., *Fluorides, Water Fluoridation, Cancer, and Genetic Diseases*, 12 SCI. & PUB. POL'Y 36 (1985); Rudolf Ziegelbecker, *Zur Frage eines Zusammenhanges zwischen Trinkwasserfluoridierung, Krebs, und Leberzirrhose*, 218 GWF WASSER/ABWASSER 111 (1987); Dean Burk et al., *A Current Restatement and Continuing Reappraisal Concerning Demographic Variables in American Time-Trend Studies on Water Fluoridation and Human Cancer*, 61 PROC. PA. ACAD. OF SCI. 138 (1988) [hereinafter Burk, Graham, & Morin].

109. See WHO'S WHO IN THE WORLD 1974-1975 161 (2d ed., Marquis Who's Who, Inc., 1975); *National Cancer Program (Part 2), Hearings Before the Subcomm. of the Comm. on Government Operations, 95th Cong.*, 471 (1977) [hereinafter *National Cancer Program*].

110. Dr. Burk's capacity to view and characterize phenomenal reality is illustrated in his trademark paper, Dean Burk & Hans Lineweaver, *The Determination of Enzyme Dissociation Constants*, 56 J. AM. CHEM. SOC'Y 658 (1934), which has been one of the most often cited and discussed papers in biochemistry during the twentieth century.

The epidemiological work here in question was done under the direction of Dr. Burk from his retirement until his death in 1988. As with so much of his work before his retirement, he was years ahead of his time.

On December 16, 1975, the Congressman James Delaney of New York inserted into the *Congressional Record* data gathered and organized under the direction of Dr. Burk, showing a striking association between fluoridation and cancer.¹¹¹ It is important to appreciate the basic data, because it was the principal and decisive focus of the judicial hearings that followed.¹¹²

The year-by-year average observed cancer death rates of ten large central cities of the United States, which served as the control group and remained unfluoridated from 1940 through 1968, were compared for the years 1940 through 1968 with the year-by-year average observed cancer death rates of ten large central cities of the United States which served as the experimental group and remained unfluoridated from 1940 through 1951, but fluoridated between 1952 and 1956, and remained fluoridated through 1968 and thereafter.¹¹³ The experiment came to an end in 1968 because fluoridation was introduced in the control cities step-by-step from and after 1969. The necessary data are available for all years except for 1951 and 1952.

The central cities in question are all very large, comparable in size, and spread out across the whole country. In the control group were: Los Angeles; Boston; New Orleans; Seattle; Cincinnati; Atlanta; Kansas City (Missouri); Cincinnati (Ohio), Newark, and Portland.¹¹⁴ In the experimental group were: Chicago; Philadelphia; Baltimore; Cleveland; Washington D.C.; Milwaukee; St. Louis; San Francisco; Pittsburgh; and Buffalo.¹¹⁵

Roughly speaking, the comparison is between about seven million people in the ten control cities and about eleven million people in the ten experimental cities over about thirty years.¹¹⁶

111. See 121 CONG. REC. 40773-75 (1975).

112. The technical particulars of the selection, derivation, and arrangement of the basic data are precisely described in the method section of Burk & Yiamouyiannis, *supra* note 108, at 103-05, and Burk, Graham, & Morin, *supra* note 108, at 138-39.

113. See Burk & Yiamouyiannis, *supra* note 108, at 104; Burk, Graham, & Morin, *supra* note 108, at 138.

114. See Burk & Yiamouyiannis, *supra* note 108, at 104; Burk, Graham, & Morin, *supra* note 108, at 138.

115. See Burk & Yiamouyiannis, *supra* note 108, at 104; Burk, Graham, & Morin, *supra* note 108, at 138.

116. See Burk, Graham, & Morin, *supra* note 108, at 139.

There has hardly ever been a published epidemiological study using so much data, arranged in such powerful experimental design.

The basic data can be expressed as unweighted averages (giving each city equal weight, regardless of size) and as weighted averages (giving each city weight according to size). All cancer death rates here discussed are expressed as so many cancer deaths per 100,000 persons.

The basic data are given in detail in the appendix of this article.¹¹⁷ For the sake of convenience an observed or crude cancer death rate for all sites in an entire population will be designated as CDRo. It does not matter in this case whether unweighted or weighted averages are used. The pattern is numerically and visibly the same, and the differences emerging from mathematical analysis of the figures for the two types of averages are trivial. Either way the possibility of chance occurrence is far less than 1 in 1000. The weighted averages will be used here because weighted averages have been used by all critics of Dr. Burk's work, and Dr. Burk frequently used weighted averages himself.

The data are arranged in standard experimental design, comparing like along a base line from 1940-50 in which cancer death rates grew equally, then continuing the comparison after fluoridation was introduced in the experimental cities. It was after fluoridation began that there was a pronounced acceleration in cancer mortality in the experimental group (+F) as compared with the control group (-F). The resulting association between fluoridation and cancer can be conveniently quantified by linear regression¹¹⁸ analysis for the data for 1940-50, also for 1953-68 then extend the resulting lines to achieve values for 1950 and 1970:¹¹⁹

117. The figures and tables set forth in the appendix are taken from Burk, Graham, & Morin, *supra* note 108, at 139-40. The basic data can be recapitulated by any informed and impartial investigator drawing from census figures and vital statistics published by the government of the United States.

118. Linear regression is a standard technique in statistics for characterization of a field of points on a two-dimensional graph as a straight line. This line is also drawn so that the sum of the squares of the several points to the line is the lowest possible number. Such line is assumed in the product moment formula for the linear correlation coefficient, designated "r" to express the degree of association between the two axes. By use of related operations, a statistical confidence level, represented by the coefficient "P" can be derived. P determines the extent to which an observed association may or may not have occurred by chance. The subject is discussed in standard textbooks. See, e.g., SIR AUSTIN BRADFORD-HILL, *A SHORT TEXTBOOK OF MEDICAL STATISTICS* 161-67, 173-80 (10th ed. 1977); MURRAY SPIEGEL, *THEORY AND PROBLEMS OF STATISTICS* 218-20, 226-28, 244-45, 253-54 (1961).

119. See Burk & Graham, *supra* note 108, at 65; Burk, Graham, & Morin, *supra* note 108, at 142-43.

	1940	1950	1960	1970
CDRo (+F)	154.2	181.8	186.3	222.6
CDRo (-F)	153.5	181.3	183.6	188.8

The size of the association between fluoridation and cancer can be expressed as follows: $[(222.6-188.8) - (186.3-183.6)] + [(154.2-153.5) - (181.8-181.3)]$ or 31.3 excess cancer deaths per 100,000 persons exposed within fifteen to twenty years after fluoridation began in the experimental group of cities. If this figure is multiplied against 130 million Americans who have been drinking fluoridated water over the past fifteen to twenty years or more, an excess of over 40,000 cancer deaths in the United States every year are attributable to fluoridation.

Not long after the foregoing figures were first called to the public's attention, Dr. Burk was called to testify before Congress on April 6, 1976. And testify he did:

Oliver Wendell Holmes Sr., M.D., of Civil War medical fame, and professor of anatomy at Harvard University, in 1843 and 1855 described then prevailing treatment of puerperal fever in lying-in hospitals as criminal manslaughter. It was only manslaughter, however, not murder because the physicians of that day did not have, and could not have had a sufficiently knowledgeable idea of the bacteriological basis of the doctor-nurse-patient transmission of the disease until the work of Pastuer and Lister decades later.

The scientific and medical status of artificial fluoridation or public water supplies has now advanced to the stage of the possibility of socially imposed mass murder on an unexpectedly large scale involving tens of thousands of cancer deaths of Americans annually.¹²⁰

The shock resulting from this firm statement by a world-renowned cancer research scientist evoked an emergency response from the USPHS. Needless to say, the USPHS did not admit that they had exposed the American people to an environmental hazard which produced "literally tens of thousands of cancer deaths of Americans annually." As night follows day, they claimed that Dr. Burk had failed to take elementary precautions.¹²¹

120. *Departments of Labor and Health, Education, and Welfare Appropriations for 1977 (Part 7), Hearings Before a Subcomm. of the Comm. on Appropriations, 94th Cong. 1063-64 (1976) (statement of Dr. Burk).*

121. This protest first appeared in a letter of February 6, 1976, from Dr. Ronald Frederickson, Director of the National Institutes of Health, to Congressman James Delaney of New York. This letter has not been officially published, but the particulars are set forth in the

Their pretext was that he and his associates had not adjusted the basic data for age, race and sex, and that, when such adjustments were done, there was no association between fluoridation and cancer.¹²² Their claim essentially was that, among 18 million people in twenty large cities over thirty years, it so happened that the experimental cities grew older faster just as they were fluoridated, at that this aging occurred precisely to the extent necessary to create the shocking appearance of an association between fluoridation and cancer.¹²³ This association, they held, was merely an illusion deceiving the ignorant. It sounds far-fetched. It was worse than far-fetched.

It is obligatory to note the Dr. Burk and those working with him adjusted for demographic variables on numerous occasions.¹²⁴ Beyond his published scholarship, he repeatedly gave detailed testimony on these questions in public hearings¹²⁵ and courts of justice.¹²⁶ But his view was that the basic data are best not adjusted in this particular case, because the base line established by the data for 1940 through 1950 already controls for all known and unknown variables.¹²⁷

Cancer incidence and mortality are influenced by countless demographic, environmental, dietary, socio-economic, and other factors, some tending to increase, others tending to decrease the extent of the disease. It is known, for example, that older people tend to experience more cancer than younger people, yet good diet and environment can significantly offset the effects of age. Adjustments

prepared statement of Dr. Arthur Upton, Director of the NCI, to Congress on October 12, 1977. See *National Cancer Program*, *supra* note 109 at 104-20.

122. See *id.* at 98-103 (statement of Dr. Guy Newell, Deputy Director of NCI).

123. See *id.* at 80-83 (statement of Dr. Robert Hoover, NCI).

124. Dr. Burk's interest in such adjustments first surfaced at the meeting of the American Society of Biological Chemists in San Francisco on June 6-10, 1976, where he joined Dr. John Yiamouyiannis in a paper setting forth partial adjustments of the basic data of age and race by the direct method. See Dean Burk & John Yiamouyiannis, *Fluoridation of Public Water Supplies and Cancer Death Rates*, 35 *FED. PROC. AM. SOC. BIOL. CHEM.* 1707, (1976). Dr. Burk's more advanced adjustments of the basic data for demographic variables absorbed twelve years of his life's work and included, among others, articles published by the International Society of Fluoride Research and the Pennsylvania Academy of Science. See Burk & Yiamouyiannis, *supra* note 108; Burk & Graham, *supra* note 108; Burk, Graham, & Morin, *supra* note 108. He was the major inspiration of these several articles. His matured views are best expressed in the last, published in 1988 not long before his death.

125. For example, see his formal statement to a hearing panel of the EPA on June 17, 1985, including nineteen tables outlining multiple adjustments by the indirect method for age, race and sex, reprinted in *NATIONAL FLUORIDATION NEWS*, Vol. XXXI, no. 4 (1985).

126. See *Safe Water Found. of Tex. v. City of Houston*, No. 80-52271, Trial Transcript, Jan. 13-14, 1982, at 48-105 (151st Jud. Dist., Tex.)

127. See *id.* at 46-48, 105-07.

for age in particular, and perhaps also for race and sex, may be important in comparing two populations at one point in time, because such adjustments may serve as a control for such demographic variables.¹²⁸ Yet a very different situation emerges when, as in the case of the basic data here in question, there is a comparison of trends over time, including a long base line.¹²⁹

There are established principles of inductive logic which are associated historically with William of Ockham¹³⁰ and Sir Isaac Newton.¹³¹ They are used in the empirical sciences for the discovery or identification of causes in nature. Given a strong trend or association observed in nature, take the simplest and most fitting explanation as the cause, unless and until the contrary be shown. Likewise, attribute like causes to like effects, unless and until the contrary be shown. Finally, where cause and effect in certain circumstances are fairly ascertained by proper experiment, such cause and effect may be generalized throughout the universe, unless and until the contrary is shown.

Given these principles of natural reason, and given what is known about fluoride, including especially its demonstrated carcinogenic potential,¹³² the simplest and most fitting explanation of the basic data is that all cancer-influencing factors counterbalanced each other during the long base line period before 1950; that all these factors continued to counterbalance each other after 1950 except for the one factor known to be new, viz., fluoridation; and that, therefore, the entire observed association between fluoridation and cancer in the basic data, i.e., 31.3 excess CDs/100,000 after 15-20 years of exposure, is attributable to fluoridation as the cause.¹³³ It can then be generalized by saying that artificial fluoridation of public water supplies causes an immense amount of cancer in the United

128. See, e.g., Burk & Graham, *supra* note 108, at 65; Burk, Graham, & Morin, *supra* note 108, at 139-40.

129. See, e.g., Burk & Graham, *supra* note 108, at 65; Burk, Graham, & Morin, *supra* note 108, at 140.

130. Ockham's emphasis on the simplest explanation as the best explanation, often called "Ockham's razor," grew out of his philosophical treatment of universals, relations, causation, and motion. See COPLESTON, *supra* note 106, pt. I, at 69-71, 80-81, 83-88.

131. At the beginning of the third book of his *PHILOSOPHIAE NATURALIS PRINCIPIA MATHEMATICA*, Sir Isaac Newton laid down his "rules of reasoning in natural philosophy" for the identification of causes in phenomenal reality, including the simplicity principle, sometimes called "Ockham's Razor." See 5 COPLESTON, *A HISTORY OF PHILOSOPHY*, pt. I, 162-64 (1964).

132. See generally Taylor, *supra* note 16; Taylor & Taylor, *supra* note 20; sources cited *supra* note 21.

133. See Burk & Graham, *supra* note 108, at 65; Burk, Graham, & Morin, *supra* note 108, at 139-40.

States, "involving tens of thousands of cancer deaths of Americans annually."

Adjustments for age, race, and sex are here meant to account for demographic factors which have already been addressed by the base line. Such adjustments will therefore tend to control more than once for the same factors and so, in this context, will tend to understate reality. Changes in the demographic composition of the control and experimental cities have in some degree been counteracted by other factors, and the adjusted figures will not reflect this counteracting effect. So again, adjustments will tend to understate reality.

Dr. Burk respected conventional opinion, but he did not adore it. And since conventional opinion demands adjustments for age, race, and sex, not because he thought they clarified the meaning of the basic data, he cheerfully went along. It is ironic that the scientist who thought these adjustments least useful did more than all others to assure that they were properly done. His guiding principle in dealing with the subject was that, if adjustments were to be executed, they should rest upon standard methods, and be carried out as comprehensively and thoroughly as possible, otherwise not at all.

It is no less ironic that the attack against his epidemiological work was spearheaded by the National Cancer Institute which he had served with such distinction before his retirement. The confrontation initially developed in hearings on September 21 and October 12, 1977, in Congress.¹³⁴

In these hearings, the National Cancer Institute came forth with its objections in a definitive, 17-page document.¹³⁵ It was presented under the signature of the director Dr. Arthur Upton, and introduced in committee by the deputy director Dr. Guy Newell. This "Upton Statement" was then and still is the official position of the government of the United States. It is reputed to be the irrefutable answer to the thesis of Dr. Burk and his colleagues. The scientific debate since then has turned upon the Upton Statement, which lays down a characteristic adjustment of the basic data for age, race, and sex by the indirect method, an orthodox procedure for this purpose.¹³⁶

In this procedure, we ordinarily compare two populations at a certain point in time in terms of the ratio of the observed cancer death rate (which we have called CDRo) to the "index" or

134. The key contributions of historic significance on both sides are reprinted in *National Cancer Program*, *supra* note 109, at 3-60, 75-83, 98-140, 181-212, 219-30, 305-18 (1977).

135. *See id.* at 104-20.

136. *See* BRADFORD-HILL, *supra* note 118, at 190-96.

"expected" cancer death rate (which we shall call CDR_e) of each population.

In deriving an "expected" CDR, we ascertain from census figures the number of persons in each demographic category of the observed populations. In addressing Dr. Burk's basic data, the staff at NCI used forty such categories, viz., age groups 0-4, 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85+, each divided into white male, white female, nonwhite male, and nonwhite female.

We must then select a "standard population," drawn from census figures and vital statistics for a certain territory and year: this standard population really consists of a set of known cancer death rates for each category in the population. The choice of this standard population requires some judgment. The staff at NCI selected the United States in 1950,¹³⁷ which is not, in our view, an unreasonable choice, because it represents a fair estimate of what cancer experience should be, category by category, in the absence of anything tending to make cancer deaths higher or lower than usual.

For each population compared, the number of persons in each category is multiplied by the corresponding rate in the standard population. Expected cancer deaths so determined are added up, then divided by the total population, and reduced to a common denominator of 100,000. The resulting "expected" CDR will be what may be anticipated for the population in view of its demographic composition.

The fraction CDR_o/CDR_e is called a standardized mortality ratio or SMR. If based on good judgment, it will indicate the extent to which the observed cancer death rate of a given population is higher or lower than what should be expected under normal circumstances in view of its demographic structure.

The Upton Statement sets forth an adjustment of the basic data expressed in weighted averages. The SMRs are as follows:¹³⁸

	1950	1970	Change
CDR _o /CDR _e (+F)	1.23	1.24	+01
CDR _o /CDR _e (-F)	1.15	1.17	+02

Using these figures, the NCI asked Congress to believe that, relative to what may be expected in light of the age structure of the

137. See *National Cancer Program*, *supra* note 109, at 112, 224.

138. See *National Cancer Program*, *supra* note 109, at 118.

two groups of cities observed, cancer mortality actually grew 1% faster in the unfluoridated cities than in the fluoridated cities.¹³⁹

Dr. Burk and his colleagues had a remarkable answer:¹⁴⁰ The available and pertinent data for the years after 1950, were 1953-1968. Without the trends in these years, nobody would suspect that there is a causal relationship between fluoridation and cancer. In its adjustment, the NCI considered 1950 before fluoridation began the experimental cities, and 1970 after fluoridation had already been initiated in the control cities, and did not consider the years 1953-1968 which were the whole basis of concern. In other words, the NCI simply derived their CDRo values from data reported for 1950 and 1970, and ignored all else, as if 1953-1968 were unimportant.

Having omitted all available and pertinent data in their adjustment, it is not surprising that the NCI came up with the wrong answer. In the same hearings before Congress, it was demonstrated by a colleague of Dr. Burk that, if the adjustment proposed by the NCI is undertaken using all available and pertinent data after 1950, there emerges an impressive association between fluoridation and age-race-sex adjusted cancer mortality.¹⁴¹

139. See *id.* at 81, 112.

140. See *id.* at 64-65. See also Burk & Graham, *supra* note 108, at 67-68; Burk, Graham, & Morin, *supra* note 108, at 142-43.

141. Dr. John Yiamouyiannis executed an adjustment of the basic data, using weighted averages and 1950 as the standard population, exactly as stipulated in the Upton Statement. He adjusted only for the years after 1950, deriving CDRo values for 1950 and 1970, by linear regression analysis of the CDRo data for 1950 and 1953-1969, and showed an association in terms of $CDRo/CDRe = +.042$, and in terms of $CDRo-CDRe = 12.4$ cancer deaths per 100,000 persons exposed within after fifteen to twenty years after the introduction of fluoridation in the experimental cities. See *National Cancer Program*, *supra* note 109, at 64-65. The main objection to this technique came from Dr. David Newell of the Royal Statistical Society in defense of the Upton Statement. He claimed that, because populations between census years and thus denominators in intercensal CDRs must be estimated by linear interpolation, they are not reliable data, and therefore not suitable for linear regression analysis. See *Aitkenhead v. Borough of West View*, No. GD-4585, Trial Transcript, May 8, 1978, at 72, 72A, 73-76 (Allegheny Court of Common Pleas, Pa). This criticism was exploded by none other than Dr. Guy Newell, Deputy Director of the NCI, who supervised preparation of the Upton Statement and introduced it before Congress. Later speaking as a professor of epidemiology at the University of Texas, he stated emphatically that use of linear interpolation to derive denominators in intercensal CDRs is "accepted procedure" in modern applied epidemiology, and, therefore, perfectly reliable. See *Safe Water Found. of Texas v. City of Houston*, No. 80-52271, Trial Transcript, Jan. 26, 1982, at 1648-54 (151st Jud. Dist., Tex.). The correctness of undertaking a linear regression analysis of intercensal CDRs in which the denominators were estimated by linear interpolation was further confirmed by Dr. Hubert Arnold, professor of statistics at the University of California, Davis. See *National Cancer Program*, *supra* note 109, at 580. The propriety and necessity of such use of interpolated data, based on fundamental principles of inductive logic, is discussed in Burk & Graham, *supra* note 108, at 68-69, and Burk, Graham, & Morin, *supra* note 108, at 143-44.

Dr. Burk developed even more comprehensive adjustments. In doing so, he considered the years before and after 1950, because the observed CDRs portray a change in trends after 1950 and a change from trends before 1950.¹⁴² The data representing 1953-1968 were important, but they were especially important in view of what happened in 1940-1950. The need to consider the years before and after 1950 became clearer from the fact that there were demographic fluctuations before and after 1950: it appeared that these fluctuations both before and after 1950 could materially influence the size the association adjusted for age, race, and sex.

Dr. Burk derived CDR_o values for 1940 and 1950 by linear regression analysis of the data for 1940-1950, and for 1950 and 1970 by linear regression analysis of the data for 1953-1968.¹⁴³ He derived CDR_e values, using 1950 as the standard population, exactly as stipulated in the Upton statement.¹⁴⁴ He used the SMR or CDR_o/CDR_e, and also the difference between observed and expected CDRs, i.e., CDR_o-CDR_e, which is also used by conventional epidemiologists.¹⁴⁵ His results can be summarized as follows:¹⁴⁶

Cities	1940	1950	1950	1970
CDR _o (+F)	154.2	181.8	186.3	222.6
CDR _e (+F)	128.1	146.9	146.9	174.7
CDR _o /CDR _e (+F)	1.204	1.238	1.268	1.274
CDR _o -CDR _e (+F)	26.1	34.9	39.4	47.9
CDR _o (-F)	153.5	181.3	183.6	188.8
CDR _e (-F)	140.3	155.5	155.5	166.0
CDR _o /CDR _e (-F)	1.094	1.166	1.181	1.137
CDR _o -CDR _e (-F)	13.2	25.8	28.1	22.8

142. On the importance of adjusting both for the period before fluoridation was begun in the experimental cities and the period after, then reaching a combined result, see Burk & Graham, *supra* note 108, at 67, and Burk, Graham, & Morin, *supra* note 108, at 142-43.

143. See Burk & Graham, *supra* note 108, at 67; Burk, Graham, & Morin, *supra* note 108, at 142.

144. The particulars of the NCI adjustments are laid out more clearly in the paper of the Royal Statistical Society defending the Upton Statement. See *National Cancer Program*, *supra* note 109, at 224-29.

145. See *id.* at 227-28 (Royal Statistical Society).

146. See Burk & Graham, *supra* note 108, at 67-68. Dr. Burk preferred another similar adjustment based on the indirect method, using weighted averages and US-1940 as the standard population, then combining the impact of changes both before and after 1950 in "time independent" terms. This adjustment yields the conclusion that 69.2% of the observed association between fluoridation and cancer, as reflected in the basic data, cannot be explained by demographic differences. See Burk, Graham, & Morin, *supra* note 108, at 142-43.

There figures can be transformed into coefficients which reflect an association between fluoridation and CDRs adjusted for age, race, and sex, as it developed from 1940 to 1970:

The change in $CDRo/CDRe = [(1.274-1.137) - (1.268-1.181)] + [(1.204-1.094) - (1.238-1.166)] = +.088$. This coefficient means that, relative to what might be expected in light of the demographic structure of the two populations here in question, adjusted cancer mortality grew about 9% faster in the fluoridated cities.

In terms of $CDRo-CDRe$, fluoridation is associated with $[(47.9-22.8) - (39.4-28.1)] + [(26.1-13.2) - (34.9-25.8)] = 17.6$ excess cancer deaths per 100,000 persons exposed after 15-20 years. This adjusted figure, multiplied against 130 million Americans now drinking fluoridated water 15-20 years, works out to something on the order of 23,000 excess cancer deaths every year in the United States.

Whether adjusted or unadjusted figures are preferred, the size of the human casualty is so large and tragic that it is almost indecent to quibble over the numbers. Over twenty years have passed, and the casualty has mounted, since the NCI represented to Congress, on the basis of demographic adjustments which left out all available and pertinent data, that there is no association between fluoridation and cancer.

VII. THE JUDICIAL FINDINGS CONDEMNING FLUORIDATION

In the wake of the hearings in Congress just discussed, litigation seeking to resist or restrain further implementation of fluoridation began in several places in the United States. In Ohio it had recently been held that fluoridation was a constitutional exercise of police power.¹⁴⁷

But in light of the recent publication of the basic data gathered under the direction of Dean Burk, opportunities for a new judicial hearing vastly improved. When such a hearing was sought, the Ohio Supreme Court commented:

A more difficult question is raised by the claim that fluoride is a carcinogen based on statistics that the cancer death rate has increased in certain cities with fluoridated water, while remaining the same in certain other cities which do not fluoridate. The evidence for this claim has not been tested by litigation and is disputed by other authorities. This evidence has also been submitted to federal agencies and to the Congress. If scientifically proved,

147. See *City of Canton v. Whitman*, 337 N.E.2d 766 (Ohio 1975); *City of Cincinnati v. Whitman*, 337 N.E. 2d 773 (Ohio 1975).

these claims could raise legitimate questions as to the constitutionality of fluoridation as a public health measure, and, since these claims are based upon very recent studies, the purposes underlying the principle of *res judicata* would probably not be served by barring litigation to determine the validity of these claims.¹⁴⁸

Reading this statement side by side with *Jacobson v. Massachusetts*,¹⁴⁹ and *Paduano v. City of New York*¹⁵⁰, a suit before the judiciary attacking the constitutionality of mandatory fluoridation should succeed if it could be established by a fair preponderance of the evidence that the measure causes or contributes to the cause of cancer in man. But the court held that the judiciary had no original jurisdiction to consider the question, ostensibly because, in Ohio, the power to find the facts was vested by statute in an administrative agency.¹⁵¹ The holding seems to have been created post hoc to avoid a touchy question.

It would have been easy for the court to rely on respectable authority to the effect that, where a constitutional question is fairly raised, and the outcome depends on facts, especially where personal rights are involved, exhaustion of administrative remedies is not necessary, and the judiciary can take jurisdiction to hear the evidence and decide the controversy on the merits.¹⁵² No further headway was made in Ohio because the plaintiffs too well understood that impartial consideration by the administrative agency, where fluoridation was institutional policy, was as hopeless as an unbiased attitude by the NCI and other institutes in the USPHS.

A. The Pittsburgh Case

However, it was not necessary to wait very long for the opportunity to be fairly heard on the new evidence in Pittsburgh in the case of *Aitkendedead v. Borough of West View*.¹⁵³ The case was assigned to Judge John Flaherty who has since become the Chief Justice of Pennsylvania. The suit rested on a theory of nuisance, and

148. *City of Cincinnati ex rel. Crotty v. City of Cincinnati*, 361 N.E.2d 1340, 1341-42 (Ohio 1977).

149. *See* 197 U.S. 11, 39 (1905).

150. 257 N.Y.S.2d 531, 542 (N.Y. Sup. Ct. 1965)

151. *See* 361 N.E.2d at 1342.

152. *See, e.g., United States v. Sisson*, 297 F. Supp. 902, 906 (D. Mass. 1969) *appeal dismissed*, 399 U.S. 267 (1970); *Bare v. Gorton*, 526 P.2d 379, 383-84 (Wash. 1974). This exception to the rule on exhaustion of administrative remedies is ultimately rooted in the "constitutional fact" doctrine in *Ng Fung Ho v. White*, 259 U.S. 276, 282-83 (1922) and *Ohio Valley Water Co. v. Ben Avon Borough*, 253 U.S. 287, 289 (1920).

153. No. GD-4585-78 (Allegheny County Court of Common Pleas, Pa.).

went to hearing on a motion for a preliminary injunction. Expert witnesses from the National Cancer Institute, the National Academy of Sciences, the Royal Statistical Society, and the Royal College of Physicians appeared to oppose the testimony of Dr. Burk and his colleagues, as had occurred in Congress.¹⁵⁴ After many sessions, followed by extensive summations on both sides, Judge Flaherty made his findings on November 16, 1978. He first described the main evidence by stating:

Over the course of five months, the court held periodic hearings which consisted of extensive expert testimony from as far away as England. At issue was the most recent time trend study of Dr. Burk and Dr. Yiamouyiannis, which compared the cancer mortality of 10 cities which fluoridated their water systems with 10 cities which did not fluoridate over a period of 28 years from 1940 to 1968. The study concluded that there was a significant increase in cancer mortality in the fluoridated cities.¹⁵⁵

He defined the sole issue of fact as "whether fluoride may be a carcinogen."¹⁵⁶ He then found that "[p]oint by point, every criticism made of the Burk-Yiamouyiannis study was met and explained by the plaintiffs. Often, the point was turned around against defendants. In short, this court was compellingly convinced of the evidence in favor of plaintiffs."¹⁵⁷

Judge Flaherty entered a preliminary injunction. Since the facts of the case had been fully tried, a motion was prepared for an amended complaint to attack the constitutionality of imposed fluoridation, and for a permanent injunction, based on danger to public health. The motion was about to be filed when raw power showed itself with lightning speed and impressive clout to limit the political

154. The most critical dispute in the trial was whether the basic data (set forth in the appendix of this article) should be adjusted for age, race, and sex by the methods proposed by Dr. Dean Burk or Dr. John Yiamouyiannis in *National Cancer Program*, *supra* note 109, at 18-40, 61-72, or by the method proposed in the Upton Statement, *id.* at 104-20, 220-30. The defense of the Upton Statement collapsed when Dr. David Newell of the RSS conceded that he used data only for 1950 and 1970, and considered nothing in between "for the main and simple reason" that he was sent his data from the NCI. See *Aitkenhead v. Borough of West View*, No. GD-4585-78, Trial Transcript, May 9, 1978, at 72-72A, 75-6 (Allegheny County Court of Common Pleas, Pa.). Dr. Marvin Schneiderman of NCI admitted that such intermediate data should be used, but could give no specific alternative to linear regression analysis of intercensal CDRs between 1950 and 1970. See *id.* Trial Transcript, May 9, 1978, at 47-56.

155. See No. GD-4585-78, Opinion, Nov. 16, 1978, at 6.

156. *Id.* at 6.

157. *Id.* at 9.

damage.¹⁵⁸ The Chief Judge of the Commonwealth Court of Pennsylvania quickly stayed the preliminary injunction, ignoring the facts judicially found, as if public safety were not an issue.¹⁵⁹

An administrative agency, which favored fluoridation as institutional policy, quickly and summarily entered "findings" which parroted USPHS propaganda.¹⁶⁰ Another administrative agency, which had a similar institutional policy, then entered an "order" which purported to deny the Borough of West View "permission" to obey Judge Flaherty's injunction.¹⁶¹ Events thus took bizarre turns to save a sacred cow.

Jurisdiction to enter the findings supporting the preliminary decree of November 16, 1978, was sustained on appeal shortly before Judge Flaherty was elevated to the Supreme Court of Pennsylvania.¹⁶² The Commonwealth Court held that the cause could go no further before the judiciary under the pretext that exclusive jurisdiction belonged to the administrative agency.¹⁶³ This was the end of the case, for all understood the notorious bias of the administrative agency which was not about to admit that it had promoted the dumping of carcinogenic agents into the environment. The appellate decisions left the findings of Judge Flaherty untouched, but departed widely from the traditional rule that, once a court of equity takes jurisdiction over the subject matter of a suit, such jurisdiction continues until the final decree, even though a basis for legal or administrative jurisdiction might later appear.¹⁶⁴

As the USPHS tried to press-release its way out of the crisis in the United States, the findings of Judge Flaherty became highly influential abroad. In the British House of Lords, the Earl of Yarborough accurately summed up the meaning of the case:

158. The odd appellate history of the cause is summarized in *Aitkenhead v. West View*, 442 A.2d 364 (Pa. Commw. Ct. 1982), and *Aitkenhead v. West View*, 397 A.2d 878, 878-79 (Pa. Commw. Ct. 1979).

159. See 399 A.2d at 879-80.

160. See *Aitkenhead v. Borough of West View*, No. GD-4585-78, Exhibit C (Pa. Dept. of Health, Dec. 21, 1978), Plaintiffs' Motion to Dismiss Preliminary Objections, Feb. 21, 1979 (Allegheny County Court of Common Pleas, Pa.).

161. See *id.* Exhibit A (Pa. Dept. of Env. Res., Jan. 8, 1979), Plaintiffs' Motion to Dismiss Preliminary Objections, Feb. 21, 1979. See also *id.* Order Dismissing Preliminary Objections, May 25, 1979.

162. See *Aitkenhead*, 397 A.2d at 880.

163. See *Aitkenhead*, 442 A.2d at 366.

164. The rule can be traced to Lord Eldon in *Eyre v. Everett*, 2 Russ. 381 (Ch. 1826), and *Adley v. Whitstable*, 17 Ves. Jr. 316 (Ch. 1810). See also *Gulbenkian v. Gulbenkian*, 147 F.2d 173, 176 (2d Cir. 1945); *Rosen v. Mayer*, 113 N.E. 217 (Mass. 1916).

Already this evening examples have been quoted of what occurred in America. What I read was rather different from the picture painted this evening. It was my understanding if the case quoted was the case in Allegheny [County] in Pennsylvania that it was found proven that fluoride was a danger to health. I know that there was some legal wrangle about jurisdiction but I thought, on the facts presented by a number of experts, that that was the finding and that the facts had not been challenged but merely the jurisdiction of the court.¹⁶⁵

So important was the meaning of this case that it also attracted the attention of an investigative commission of the Environment Ministry of Quebec, chaired by Dr. Benoît Bundock who had been the principal medical officer for special projects in the Canadian Ministry of Health. The commission had been diligently studying world literature on fluoridation for over a year when Judge Flaherty returned his findings. They obtained the entire record of the proceedings in Pittsburgh.

Dr. Bundock and his colleagues returned a comprehensive report on November 30, 1979, acknowledging the laboratory studies of Dr. Taylor and the basic data of Dr. Burk, specifically concurred with the findings of Judge Flaherty, and recommended executive suspension of all efforts to enforce the mandatory fluoridation law of Quebec.¹⁶⁶ This recommendation was accepted, and the moratorium has now continued almost twenty years through no less than six governments both pequist and liberal. So well regarded is this report that a standard ecology textbook, widely used in the secondary schools of Quebec, forthrightly acknowledges that fluoride in drinking water, as introduced through artificial fluoridation of public water supplies, is an environmental pollutant which causes cancer in man.¹⁶⁷

B. The Alton Case

One important early case sustaining the constitutionality of imposed fluoridation on sweeping notions of police power came out

165. 402 PARL. DEB. H.L. (5th ser.) 1446-50 (1979). Another important contribution on the same occasion, including learned discussion on the epidemiological work of Dr. Dean Burk, came from the Deputy Speaker, Lord Douglas of Barloch. *See id.* at 1461-68. See also the recent and informed speeches by the Earl Baldwin of Bewdley in 593 PARL. DEB. H. L. (5th ser.) 1394-99, 1427-29 (1998).

166. *See* Jean-Benoît Bundock et al., *Les fluorures, la fluoruration, et la qualité de l'environnement*, MINISTÈRE DE L'ENVIRONNEMENT, GOUVERNEMENT DU QUÉBEC, at 1-2, 103-04, 107-08, 116-17, 197-200 (1979).

167. *See* JACQUES VIEL ET PAUL DARVEAU, *POUR UNE PENSÉE ÉCOLOGIQUE* 35 (1984).

of the Illinois Supreme Court.¹⁶⁸ Some years later a suit was brought to enjoin fluoridation on allegations of new evidence not previously considered. The complaint was dismissed on demurer, but the Appellate Court of Illinois held that, taking the facts alleged as true, *res judicata* did not bar the suit, because *res judicata* cannot bar reconsideration of an issue on the basis of evidence which did not exist when the judgment was initially entered.¹⁶⁹ The remand occurred in 1972, and the case floundered in legal horseplay in the circuit court until a trial was forced eight years later in Alton, where Lincoln and Douglas had debated the Dred Scott case before the Civil War.

*Illinois Pure Water Committee v. Director of Public Health*¹⁷⁰ was tried from April through June 1980 before Judge Ronald Niemann. It was a case of uncommon ferocity with endless dilatory motions and preposterous contentions by the State, causing the trial to move at a snail's pace.

Judge Niemann endured the experience with almost inhuman patience. He had a highly skeptical attitude about the testimony offered on behalf of the plaintiffs and he reacted to the large numbers generated by the basic data with astonishment and disbelief. He discounted much of what he heard, but at length was satisfied that the plaintiffs had at least made a *prima facie* case of danger to public safety.¹⁷¹

Judge Niemann turned to the State and asked it to account for the association between fluoridation and cancer reflected by the basic data.¹⁷² It should be kept in mind that Chicago is the home of the ADA which has at its command every expert in the world to support fluoridation as a public health measure. Even so, no world class scientists appeared to defend fluoridation as in the hearings before Congress and the trial in Pittsburgh.¹⁷³

168. See *Schuringa v. City of Chicago*, 198 N.E.2d 326 (Ill. 1964).

169. See *Illinois Pure Water Comm. v. Yoder*, 286 N.E.2d 155, 157-58 (Ill. App. Ct. 1972).

170. See No. 68-E-128 (Madison County Circuit Court, Ill.). The full record of the proceedings is not available to us, but the final decree entered by Judge Nieman on February 24, 1982, is fairly detailed in describing the procedural history and the scientific evidence presented on both sides. Moreover, the summations of the evidence and the legal arguments on both sides, only slightly abridged, have been conveniently and accurately published by the National Health Action Committee in 2 HEALTH ACTION, No. 11-12 (1981) [hereinafter HEALTH ACTION].

171. See *Illinois Pure Water Comm'n v. Dir. of Pub. Health*, No. 68-E-128, Final Decree, Feb. 24, 1982, at 9-10, 20-1, 29 (Madison County Circuit Court, Ill.).

172. See *id.* at 10, 29, 33.

173. See *id.* at 10.

A state-hired epidemiologist went so far as to claim that the basic data was invalid because the basic data linking fluoridation with cancer had been selected and organized to meet the requirements of experimental design. In other words, he condemned the comparison of like with like before introducing fluoridation in the experimental cities, then observing the subsequent difference in cancer mortality between the two groups invalidated the data. Instead, he said, it was statistically necessary to select fluoridated and unfluoridated cities of the country at random,¹⁷⁴ which, of course, would have assured no control for known and unknown variables.

The same epidemiologist spoke of the need for adjustments for age, race, and sex, yet the plaintiffs' case in chief was full of detailed demographic adjustments of the basic data by the direct and indirect methods.¹⁷⁵ A large box of original data, rows of government publications, and a thick bundle of sheets of calculations were brought into the courtroom for inspection. The same epidemiologist made generalized claims that his adjustments wiped away any association between fluoridation and cancer, yet he conspicuously offered no specific figures or documented calculations in support of his projections.¹⁷⁶

"What causes cancer?" asked the attorney general of Illinois in his summation, "Apparently, nobody knows."¹⁷⁷ Judge Niemann pondered the case for almost two years. On February 24, 1982, he entered judgment. He thus stated the law:

The presumption of the validity of legislation is overcome when the plaintiff makes a prima facie case. The traditional concept of burden of proof resting on the plaintiff, once met, shifts to the government to justify its intrusion into the life and health of the individual. When the State is involved, the traditional view is that the 'King can do no wrong.' Although the King must constantly act for his subjects, certainly he has been wrong a time or two.¹⁷⁸

Judge Niemann specifically found, "[This legislation] exposes the public to the risk, uncertain in its scope, of unhealthy side effects of artificial fluoridation of public water supplies, is unreasonable, and [is] a violation of the due process clause of the Illinois Constitution of

174. See HEALTH ACTION, *supra* note 170, 16-19 (Plaintiffs' Summation), and 53-54 (Defendant's Summation).

175. See *id.* at 20-26 (Plaintiffs' Summation).

176. See *id.* at 56-58 (Defendant's Summation).

177. *Id.* at 62 (Defendant's conclusion in final argument).

178. Illinois Pure Water Comm. v. Director of Pub. Health, No. 68-E-128, Final Decree, Feb. 24, 1982, at 29 (Madison County Circuit Court, Ill.).

1970."¹⁷⁹ He added with disappointment, "This record is barren of any credible and reputable scientific epidemiological studies and/or analysis of statistical data which would support the Illinois Legislature's determination that fluoridation of public water supplies is both a safe and effective means of promoting public health."¹⁸⁰ Accordingly, Judge Niemann entered a permanent injunction enjoining the State and its subdivisions from further implementation of fluoridation in Illinois.¹⁸¹

A direct appeal was immediately taken to the Illinois Supreme Court. Like lightning, the injunction was stayed without any consideration of the evidence, as if power, and not public health, were the name of the game.¹⁸² As night follows day, the Illinois Supreme Court reversed the judgment of the circuit court citing broad notions of police power.¹⁸³ Particularly offensive about the opinion were numerous petty and vindictive comments made against the plaintiffs' witnesses,¹⁸⁴ harmful to the dignity of the bench.

There was also dissimulation regarding the record, as may be illustrated. Judge Niemann had specifically found that the statute was "unreasonable," and therefore unconstitutional, because a prima facie case had been made that fluoridation exposes the population to a tangible risk, albeit uncertain in extent, of unhealthy side effects, and that no "credible and reputable" evidence had been given to justify the intrusion.¹⁸⁵ Yet the Illinois Supreme Court attempted to characterize Judge Niemann's position to be "not that the risk was so great that fluoridation was unreasonable, but that the question was shown to be debatable. Under these circumstances the plaintiffs have failed to show an unreasonable exercise of the police power."¹⁸⁶

C. *The Houston Case*

A third case arose in the Lone Star State, entitled *Safe Water Foundation of Texas v. City of Houston*.¹⁸⁷ The case brought to trial in January 1982, before Judge Anthony Farris. The petition prayed for a declaratory judgment that a recently enacted city ordinance impos-

179. *Id.* at 32.

180. *Id.* at 33.

181. *See id.* at 44.

182. *See Illinois Pure Water Comm. v. Director of Pub. Health*, 470 N.E.2d 988-89 (Ill. 1984).

183. *See id.* at 991-92.

184. *See id.* at 989-90.

185. *See id.* No. 68-E-128, Final Decree, Feb. 24, 1982, at 29, 32, 33.

186. 470 N.E.2d at 992.

187. No. 80-52271 (151st Jud. Dist., Tex.).

ing fluoridation in Houston was unconstitutional, and it sought an injunction prohibiting implementation of the ordinance within the municipality.¹⁸⁸

The trial before Judge Farris moved at an energetic pace, not atypical of judicial proceedings in Texas. It was distinguished by polished testimony on both sides. The best available witnesses from several universities defended fluoridation. Cross-examination was crisp and businesslike. The rules of evidence were somewhat relaxed¹⁸⁹ so as to permit practical inclusion of more information in less time. The bench firmly managed the proceedings. The trial was efficient, ample, rigorous, and thorough.

Whereas in Pittsburgh and Alton, the issue was reduced to whether or not fluoridation induces cancer in man, in Houston a larger range of evidence was considered. These issues included, aside from cancer, whether fluoridation induces genetic damage,¹⁹⁰ intolerant reactions,¹⁹¹ and chronic toxicity,¹⁹² not to mention other disputed points.

Counsel and witnesses for the plaintiffs conceded that a rational controversy exists over the effectiveness and safety of fluoridation.¹⁹³ It was so stipulated, because a good measure of knowledge is awareness of both sides of the question. There were a few fanatical pro-fluoridation witnesses who made fabulous claims of Newburgh-Kingston orthodoxy, but they did not do well. Pro-fluoridation

188. See *id.* at Second Amended Petition, Dec. 3, 1980, at 6-8.

189. See *id.* Trial Transcript, Jan. 14, 1982, at 280-287. Relying on *Urquhart v. Barnes*, 335 S.W.2d 666, 669 (Tex. Civ. App. 1960), Judge Farris held that learned treatises could be marked, introduced and received to prove their existence and the basis of the opinion offered. This ruling was made during the testimony of Doctor Albert Burgstahler, one of the foremost scholars on fluoride and fluoridation. The impact of Judge Farris' ruling was to promote an excellent record for this kind of case, as illustrated by Dr. Burgstahler's testimony on direct examination. See No. 80-52271, Trial Transcript, Jan. 14-15, 1982, at 276-429.

190. See, e.g., No. 80-52271, Trial Transcript, Jan. 18, 1992, at 539-59 (testimony of Dr. Pierre Morin). Dr. Morin testified on the laboratory studies of fluoride and mutagenesis noted by Dyson Rose and John Maurier in *Environmental Fluoride*, NAT'L RES. COUNCIL OF CANADA PUBL. NO. 16081 69-70 (1977), as confirmed by epidemiological data linking fluoride in drinking water and mongoloid births. See Ionel Rapaport, *Les opacifications du cristallin mongolisme et cataracte sénile*, 2 REV. ANTHROP. (Paris) 133 (1954); Ionel Rapaport *Contribution a l'étude du mongolisme. Rôle pathogénique du fluor*, 140 BULL. ACAD. NAT'L. MED. (Paris) 529 (1956).

191. See, e.g., No. 80-52271, Trial Transcript, Jan. 19, 1982, at 579-96 (testimony of John Lee, M.D., on the work of Dr. George L. Waldbott in *Fluoridation: A Clinician's Experience*, 73 SO. MED. J. 301 (1980), and his own clinical experience.)

192. See No. 80-52271, Trial Transcript, Jan. 19, 1992, at 609-14 (testimony of Dr. Lee on the strong association between the fluoride content of public water supplies and dental fluorosis, described by Rudolf Ziegelbecker, *Natürlicher Fluoridgehalt des Trinkwassers und Karies*, 122 GWF WASSER/ABWASSER 495 (1981)).

193. See No. 80-52271 (Plaintiffs' Summation), Feb. 4, 1982, at 4.

witnesses who displayed broader understanding were more appreciated.

At the conclusion of the trial, plaintiffs argued that they proved serious injury to the public health by a fair preponderance of the evidence, and that for this reason they were entitled to an injunction.¹⁹⁴ On the other side, counsel argued that there was a reasonable debate, and that for this reason the City was entitled to a judgment of dismissal.¹⁹⁵

On February 22, 1982, Judge Farris denied the plaintiff's motion for permanent injunction, holding that the plaintiffs "had the burden to introduce overwhelming evidence in this case. Plaintiffs had to prove that no rational relationship exists between fluoridation of city surface water and the public health. Plaintiffs had to prove that no controversial facts exist."¹⁹⁶

The plaintiffs immediately made a motion for new trial or amended order.¹⁹⁷ The argument on the motion, heard on April 19, 1982, centered on the burden of proof necessary to prevail. Judge Farris stated from the bench that the plaintiffs had proven harm by a fair preponderance of the evidence.¹⁹⁸ "If this were your run-of-the-mill litigation asking for injunctive relief," he said, "plaintiffs would have prevailed, but this is not the run-of-the-mill case."¹⁹⁹

The question was one of burden of proof, a pure question of law. It was agreed by the court and counsel that "[t]hat is why we have appellate courts."²⁰⁰ Counsel for the plaintiffs then asked for findings based on a fair preponderance of the evidence to prepare the record for appeal.²⁰¹ The court acceded to the suggestion, asking for proposals from both sides.²⁰² On May 24, 1982, Judge Farris entered his findings which were about as comprehensive and

194. See *id.* Plaintiffs' Summation, Feb. 4, 1982, at 4, 25.

195. See *id.* Defendant's Summation, Feb. 4, 1982, at 12-13.

196. See *id.* Opinion, Feb. 22, 1982, at 8. Judge Farris relied on *City of Houston v. Johnny Frank's Auto Parts Co.*, 480 S.W.2d 774 (Tex. Civ. App. 1972), which rests squarely of *Ferguson v. Skrupa*, 372 U.S. 726 (1963).

197. See No. 80-52271, Plaintiffs' Amended Motion for New Trial, Etc., April 14, 1982, at 1 (stating that, while the evidence at trial "did not eliminate the existence of a rational controversy, and was not intended or claimed to do so, the preponderance of the said evidence tended to show" that fluoridation causes or contributes to the cause of "cancer, genetic damage, intolerant reactions, and chronic toxicity, including dental mottling in man.").

198. See *id.* Hearing Transcript, Apr. 19, 1982, at 11.

199. See *id.* at 10.

200. See *id.* at 12.

201. See *id.* at 12-13.

202. See *id.* at 13-14.

desirable as any judicial findings have been in environmental law.²⁰³
The court found:

[That] the artificial fluoridation of public water supplies, such as is contemplated by [Houston] City Ordinance No. 80-2530 may cause or contribute to the cause of cancer, genetic damage, intolerant reactions, and chronic toxicity, including dental mottling, in man; that the said artificial fluoridation may aggravate malnutrition and existing illnesses in man; and that the value of said artificial fluoridation is in some doubt as to the reduction of tooth decay in man.²⁰⁴

This assessment of the facts, based on a fair preponderance of the evidence, was a reasonable and impartial picture of scientific reality as it was then understood.

If the municipal government of Houston had acted rationally in the face of these findings of fact, effectively a declaratory judgment on the weight of the evidence, the city council would have noted the danger, repealed the ordinance in the public interest, and perhaps established an investigative commission as had occurred in Quebec. But a city councilwoman, smiling broadly as cameras flashed, started the machinery which injected, into public drinking water, a substance judicially found, after an intensive and disciplined trial of the facts to be carcinogenic and mutagenic.²⁰⁵

An appeal was taken, based mainly on a venerable old case decided by the Texas Supreme Court which held that, where exercise of police power rests on assumed facts, those facts may be judicially examined and, if upon such inquiry it fairly appears that the means chosen are disproportionate to the end desired, the ordinance should be declared unconstitutional.²⁰⁶ The principle is typical of the best natural law jurisprudence which prevailed earlier in the twentieth century. Given the findings of Judge Farris, fluoridation was unconstitutional under this principle, because endangering the public with cancer and other ailments cannot be justified by a dubious possibility of reducing tooth decay. The Texas Court of Appeals

203. The findings of Judge Farris, based on a fair preponderance of the evidence, are similar to the findings of Judge Miles Lord in *United States v. Reserve Mining Co.*, 380 F. Supp 11, 15-17 (D. Min. 1974), and *United States v. Reserve Mining Co.*, 417 F. Supp 789 (D. Minn. 1976), affirmed 543 F. 2d 1210 (8th Cir. 1976). The dumping of taconite tailings was terminated on the principle that, where substantial evidence shows harm to human health, a question of public health should be judicially determined by resolving doubt against the introduction of foreign material into environment.

204. See No. 80-52271, Findings of Fact, May 24, 1982, at 1-2.

205. See *id.* at 1-2.

206. See *Houston & T.C.Ry. v. City of Dallas*, 84 S.W. 648, 653-54 (Tex. 1905).

expressly found that a fair preponderance of the evidence showed "the injection of fluoride into the City's water system would be harmful,"²⁰⁷ but, with the full support of higher tribunals, that such proof of harm was not enough to arrest an exercise of police power.²⁰⁸

Therefore, it is evident that, at least for the time, we are saddled with Hugo Black's positivist and anti-libertarian doctrines, and some years must pass before our judiciary see the need for a change of course. Years must pass as surely as years had to pass from the death of Sir John Elliot following his arrest in 1630 for a speech in Parliament, and the grand day in 1667 when the House of Lords reversed the judgment of the King's Bench which denied Sir John release on a writ of habeas corpus.²⁰⁹ Meanwhile, the findings of Judge Flaherty, Judge Niemann, and Judge Farris have since been quoted to legislative bodies from Montreal to Honolulu and from London to Canberra. Not always, but occasionally legislators have listened.

There has been other interesting political fallout from these judicial findings. On August 9-10, 1983, a strategic conference of pro-fluoridation activists, most of them deeply involved in ADA and USPHS politics took place at the University of Michigan.²¹⁰

The proceedings began with a presentation by a special counsel of the American Dental Association.²¹¹ The gentleman was introduced as a member of the rules committee of the Illinois Supreme Court, so it is clear that he was a powerful insider.²¹² He told the audience that it was he who had secured the stay of the injunction from the Illinois Supreme Court issued by Judge Niemann.²¹³

Counsel did not clearly inform his listeners that, from 1978 through 1982, three American judges in courts of superior jurisdiction had fully heard evidence on both sides: the first of these judges, by then a supreme court justice of eminent standing, entered findings undisturbed on appeal, saying he was compellingly convinced

207. *Safe Water Found. of Tex. v. City of Houston*, 661 S.W.2d 190, 192 (Tex. App. 1983), writ *ref'd n.r.e.* (Tex. 1984), appeal dismissed 469 U.S. 801 (1984).

208. *See id.* at 192-93.

209. *See, e.g.*, HENRY HALLAM, *CONSTITUTIONAL HISTORY OF ENGLAND* 299-300 (Garland Pub. 1978) (1846).

210. The proceedings were recorded verbatim in *FLUORIDATION: LITIGATION & CHANGING PUBLIC POLICY*, (Michael W. Easley et al. eds. 1983) [hereinafter *CHANGING PUBLIC POLICY*].

211. *See id.* at 3-11.

212. *See id.* at 3.

213. *See id.* at 5-6; *see also* *Illinois Pure Water Comm., Inc. v. Director of Pub. Health*, 470 N.E.2d 988, 989 (Ill. 1984).

of the danger of cancer; the second entered findings of no credible or reputable evidence to redeem fluoridation; and the third had entered comprehensive findings based on a preponderance of the evidence, expressly sustained on appeal, condemning fluoridation as posing a tangible danger of cancer and a good many other human diseases, while expressing doubt even of its capacity to reduce tooth decay.

Another speaker at the University of Michigan announced a significant change of litigation policy to perpetuate and expand fluoridation in future years. Whereas in earlier years it had been standard practice to invite trials, as had occurred in a number of earlier fluoridation cases, a new policy, following the trials in Pittsburgh, Alton, and Houston, was announced: "By avoiding a trial on the merits of fluoridation, we prevent the subjection of what we feel is a purely scientific issue to scrutiny by a judge who is likely not to have proper scientific training with which to make an objective ruling."²¹⁴ To recapitulate this interesting phase of legal and scientific history, in the trials in Pittsburgh, Alton, and Houston, one trial judge after another heard the evidence and found that fluoridation appears to be injurious to human health. Therefore, the new ADA-USPHS policy is to avoid, by all means, a trial on the merits.

This policy has been remarkably successful for over fifteen years. No case has ever gotten to trial. No pro-fluoridation witness has been cross-examined in court. Sales pitches continue before legislative bodies with a fair degree of success in the sense that mandatory or imposed fluoridation has considerably expanded. In legislative committees, witnesses usually cannot be effectively held to account for what they say.

We understand that the judicial process is far from perfect. But, now, the "purely scientific issue" mentioned at the University of Michigan and fluoridation is a purely scientific issue until legally imposed is tried in legislative proceedings by frantic political lobbying, maneuvers, ambushes, speechifying, applause, horse-trading, buttonholing, demagoguery, infighting, and posturing.

VIII. THE COMING END OF FLUORIDATION

One of the results of the hearings in Congress on September 21 and October 12, 1977, was a suggestion that the National Toxicology Program (NTP) should investigate fluoride.²¹⁵ Over twelve years,

214. CHANGING PUBLIC POLICY, *supra* note 210, at 84.

215. See *National Cancer Program*, *supra* note 109, at 319.

the NTP sputtered. At last some news was leaked to the press. On December 28, 1989, the *Medical Tribune* reported on the front page:

Fluoride appears to have caused bone cancer in rodents in a recently completed National Toxicology Program study, and the chemical is now at risk of being classified as a carcinogen, according to internal documents and statements obtained by the *Medical Tribune* from the Environmental Protection Agency.²¹⁶

Press fanfare erupted, and the main feature of this media blitz was the impression that there had been a discovery of something entirely new and previously unknown, as if the work of Alfred Taylor, Dean Burk and many others had never been done. Soon, however, the public was assured that all is well.²¹⁷

The "official" evaluation, while leaving much to be desired, gives a very different impression. The authors conceded that, although the numbers were small, the data gathered by the NTP study reveal a statistically significant dose-response trend of osteosarcomas of bone in male rats.²¹⁸ Additionally, the authors cited no less than eleven studies published in good journals, showing that fluoride is capable of inducing genetic mutation in mammalian cells and fruit flies, aggravating chromosomal aberrations in animal systems, and causing morphological transformations in Syrian hamster ovary cells.²¹⁹

The article concludes with the sedate comment that "it would appear prudent to re-examine previous animal studies and human epidemiological studies, and perform further studies as needed to evaluate more fully any possible association between exposure to fluorides and the occurrence of osteosarcomas of bone."²²⁰ We join this recommendation, adding that meanwhile artificial fluoridation of public water supplies ought to be halted across the country pending such review of the evidence, as was recommended by Dr. Bundock and his colleagues in Quebec, and that nobody having any direct or indirect interest in the conclusions ought to participate.

The recommendation for reevaluation has not been fulfilled. There are interesting reasons why.

216. Joel Griffiths, *Fluoride Linked to Bone Cancer in Fed Study*, 30 MED TRIB., DEC. 28, 1989, 1, 6.

217. See e.g., *Additive approved, Federal study says fluoride no threat*, PITTSBURGH POST-GAZETTE, Feb. 20, 1991, at 1-2.

218. See John Bucher et al., *Results and Conclusions of the National Toxicology Program's Rodent Carcinogenicity Studies with Sodium Fluoride*, 48 INT. JOUR. CANCER 733, 734-35 (1991).

219. See *id.* at 736.

220. *Id.*

On May 1, 1990, the acting Director of the Criteria and Standards Division, Office of Drinking Water in the United States Environmental Protection Agency, received a memorandum from Dr. William Marcus, Senior Scientific Advisor in the Criteria and Standards Division.²²¹ Dr. Marcus reviewed the NTP study and pointed to results suggesting carcinogenic potential of fluoride.²²² He also cited the most recent published version of the epidemiological data gathered and adjusted under the direction of Dr. Burk.²²³ Dr. Marcus urgently recommended an independent review by the EPA.²²⁴

To put it mildly, Dr. Marcus' memorandum did not inspire a warm and friendly response from the management of the EPA. In due course, Dr. Marcus sent his document to the Administrator of the EPA and to his union representative who in turn released it to the press. The public reaction was rather agitated, causing a bureaucrat from the "health effects branch" within the agency to approach Dr. Marcus' supervisor with the suggestion that he memorandum sent "the wrong message to the public."²²⁵ Shortly thereafter, Dr. Marcus was accused of "violent and aberrant behavior" and discharged.²²⁶

On December 3, 1992, following extended hearings, an administrative law judge found that Dr. Marcus had been fired on false pretexts because of his warnings against artificial fluoridation of public water supplies.²²⁷ The ALJ ordered Dr. Marcus reinstated with back salary, money damages, and attorney's fees,²²⁸ and, on February 7, 1994, the Secretary of Labor affirmed the reinstatement as ordered.

The simple and blunt meaning of this episode is impossible to misunderstand. The scientists, lawyers, and engineers at the national headquarters of the EPA have since used their union for protection against their administrators who, as the case of Dr. Marcus demonstrates, have a political agenda not necessarily in the public interest, and certainly not in the interest of the professionals at EPA

221. Dr. Marcus' historic memorandum of May 1, 1990, is a matter of public record. See *Marcus v. Environmental Protection Agency*, No. 92-TSC-5, Complainant's Exhibit 56, mentioned in the Recommended Decision and Order, Dec. 3, 1992, at 5 (U.S. Dep't Labor).

222. See *id.* at 1-3.

223. See *id.* at 3.

224. See *id.* at 4.

225. *Id.* at 5.

226. See *id.* at 6-9.

227. See *id.* at 25-28.

228. See *id.* at 30-31.

who desire the independence required to act honestly for the general welfare.

Under the protection of their union they have made plain that their administrators may set policy, but that they as professionals refuse to conceal the errors of policy set. The subject of fluoridation has come to their attention. On July 2, 1997, the union members, at a duly called meeting,²²⁹ voted unanimously in support of a resolution that read:

Our members review of evidence over the last eleven years, including animal and human epidemiology studies, indicate a causal link between fluoride/fluoridation and cancer, genetic damage, neurological impairment, and bone pathology. Of particular concern are recent epidemiology studies linking fluoride exposures to lower I.Q. in children. As professionals who are charged with assessing the safety of drinking water, we conclude that the health and welfare of the public are not served by the addition of this substance to the public water supply.²³⁰

If artificial fluoridation of public water supplies causes cancer in man, as the published laboratory studies and epidemiological surveys indicate, and as judicial findings confirm, then nobody should be surprised to see that it produces a host of other human ailments. Who should be surprised to learn that dumping a

229. At the time of this resolution, scientists, lawyers, and engineers at the national headquarters of EPA were organized in the National Federation of Federal Employees, Local 2050. These professional people are now organized as the National Treasury Employees Union, Chapter 280.

230. This resolution has been released to the press by the professional union at the national headquarters of EPA, but, not surprisingly, the government of the United States has not seen fit to publish the document. We are indebted to Dr. J. William Hirzy at EPA for our copy. Aside from the material cited in this article, the evidence considered in support of this resolution included, on the question of cancer, PERRY COHN, NEW JERSEY DEPARTMENT OF HEALTH, A BRIEF REPORT ON THE ASSOCIATION OF DRINKING WATER FLUORIDATION AND THE INCIDENCE OF OSTEOSARCOMA AMONG WHITE MALES (1992). This epidemiological survey is particularly important because its finding with respect to human males parallels the NTP study which suggests that sodium fluoride induces osteosarcomas in male rats. To the same effect, is John Yiamouyiannis, *Fluoridation and Cancer: The Biology and Epidemiology of Bone and Oral Cancer Related to Fluoridation*, 26 FLUORIDE 83 (1993). Also considered in support of the resolution of July 2, 1997, on the question of bone pathology was Lawrence Riggs et al., *Effect of Fluoride Treatment on the Fracture Rate in Postmenopausal Women with Osteoporosis*, 322 NEW ENG. J. MED. 802 (1990). Taken into account on the question of neurological impairment was Phyllis J. Mullenix et al., *Neurotoxicity of Sodium Fluoride in Rats*, 17 NEUROT. & TERAT. 169 (1995). Since published to the same effect is Julie Varner et al., *Chronic Administration of Aluminum Fluoride or Sodium Fluoride to Rats in Drinking Water: Alterations in Neuronal and Cerebrovascular Integrity*, BRAIN RES. 784 (1998) 284-98. The epidemiological studies on fluoride exposure and the I.Q.'s of children were done in China. They are abstracted in English as X. S. Li et al., *Effect of Fluoride Exposure on Intelligence in Children*, 28 FLUORIDE 189 (1995), and L.B. Zhao et al., *Effect of a High Fluoride Water Supply on Children's Intelligence*, 29 FLUORIDE 190 (1996).

carcinogen and mutagen in public drinking water has not only been accompanied by devastating increases in cancer mortality, but may also reduce human intelligence?

The end of fluoridation will take time, but not because time is necessary to develop essential scientific information. We already know enough to appreciate the enormity of the risk. We knew enough many years ago.

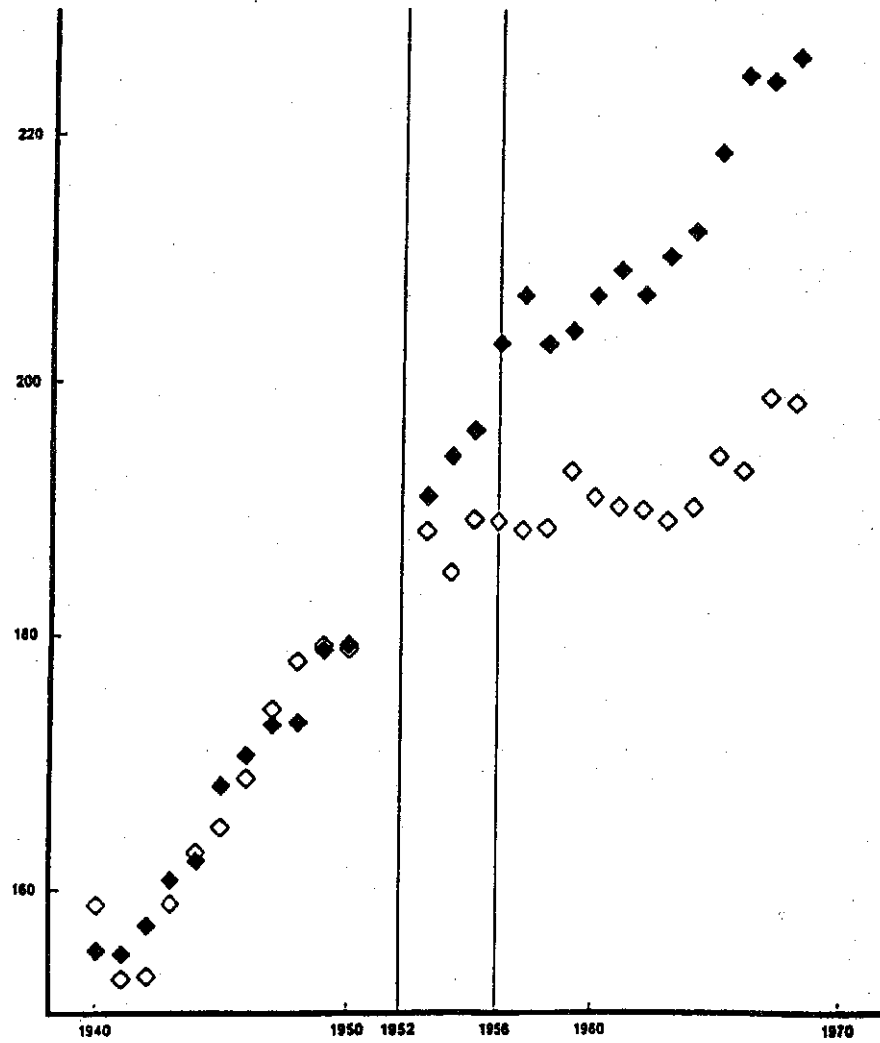
But the end will finally arrive, because, as Aristotle said at the beginning of the *Metaphysics*, all men by nature desire to know.²³¹ Ignorance cannot be perpetuated forever. The necessary legal and scientific reforms will come in the twenty-first century. Our descendants will look back on us, and they will be amazed.

231. See BASIC WORKS OF ARISTOTLE 689 (W.D. Ross trans., Richard McKeon ed. 1941).

APPENDIX

TABLE 1. The Basic Data in Unweighted Averages for 1940-1950 and 1953-1968.

Year	CDRo Control Cities (-F)	CDRo Experimental Cities (+F)
1940	158.4	155.5
1941	152.4	155.2
1942	153.9	157.2
1943	159.2	161.6
1944	162.5	162.3
1945	165.6	168.4
1946	168.5	171.6
1947	174.5	172.6
1948	178.0	173.2
1949	179.5	179.4
1950	178.9	179.6
1953	188.2	191.3
1954	185.6	194.1
1955	189.5	196.3
1956	189.1	203.6
1957	188.4	207.1
1958	188.6	203.5
1959	193.0	204.7
1960	191.1	207.0
1961	190.4	209.3
1962	190.2	207.2
1963	189.4	210.9
1964	190.3	212.6
1965	194.3	218.6
1966	193.4	224.8
1967	198.8	224.4
1968	199.4	226.4

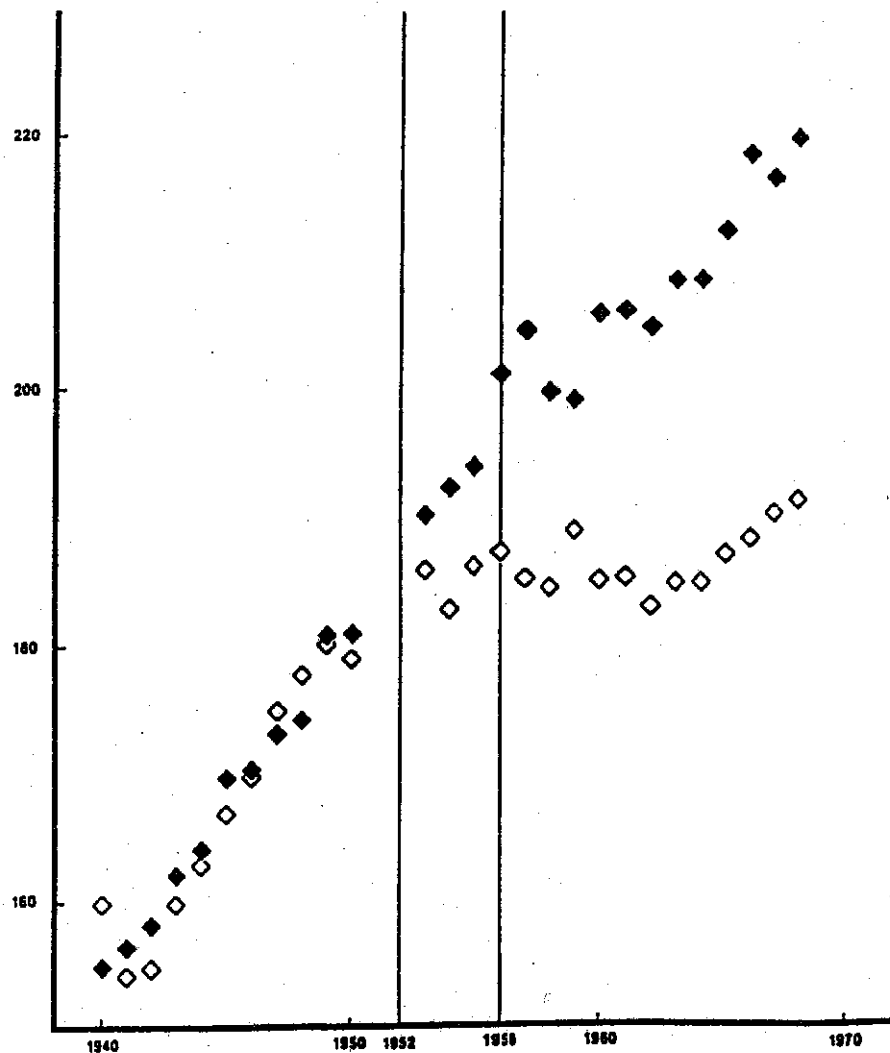
FIGURE 1. The Basic Data in Unweighted Averages for 1940-1950 and 1953-1968.^a

^a The vertical axis represents observed cancer death rates per 100,000 (CDRo). The horizontal axis represents years. The white diamonds represent the control (-F) cities. The black diamonds represent the experimental (+F) cities. The vertical lines touching the horizontal axis at 1952 and 1956 represent the period during which fluoridation was started in the experimental cities.

TABLE 2. The Basic Data in Weighted Averages for 1940-1950 and 1953-1968.

Year	CDRo Control Cities (-F)	CDRo Experimental Cities (+F)
1940	159.9	155.6
1941	154.5	156.3
1942	154.7	158.3
1943	159.8	162.4
1944	163.2	164.2
1945	167.0	168.9
1946	169.9	171.8
1947	175.0	173.9
1948	177.8	174.3
1949	180.4	181.1
1950	179.0	180.8
1953	185.9	190.2
1954	182.6	192.3
1955	186.1	193.9
1956	187.6	201.6
1957	185.2	204.5
1958	184.3	199.7
1959	188.8	201.0
1960	185.0	205.8
1961	185.7	206.0
1962	183.8	204.6
1963	184.8	208.6
1964	184.8	208.7
1965	187.0	212.5
1966	188.2	218.5
1967	190.1	218.4
1968	191.1	219.7

FIGURE 2. The Basic Data in Weighted Averages for 1940-1950 and 1953-1968.^b



^b The vertical axis represents observed cancer death rates per 100,000 (CDRo). The horizontal axis represents years. The white diamonds represent the control (-F) cities. The black diamonds represent the experimental (+F) cities. The vertical lines touching the horizontal axis at 1952 and 1956 represent the period during which fluoridation was started in the experimental cities.