

Chapter 5

How mottled teeth led to water fluoridation (WF)

How was it possible that the cause of unsightly, disfigured, weakened, and mottled teeth from drinking exceptionally soft (low in calcium and magnesium) water with a natural fluoride content of 2 -2.5 ppm, could lead to the practice of artificial water fluoridation and fluoridated toothpaste?

The search which was to discover that naturally occurring fluoride, calcium fluoride (CaF₂), in water supplies caused mottled teeth was begun by Frank McKay. He was the dentist who first alerted the dental profession to the poor brown-stained teeth he was seeing in his practice, and was passionate about finding a cure.

Frank McKay began his dental practice in Colorado Springs in America in 1901, and was concerned to find 80% of the children had poor, weakened teeth, stained yellow and brown with “ghastly chalky white patches” which were often pitted. This affliction became known as Colorado Brown Stain. (*Colorado had 2 – 2.5 ppm calcium fluoride in the water supply, though this was not known at the time*). For 15 years, McKay wrote articles and tried to get the government interested but without success, until G.V. Black, Dean of the Dental School in Northwestern University in Chicago, read one of his articles. Dean visited and stayed to help McKay write more articles to highlight this unknown condition. In 1916, together, they published an article in the Dental Cosmos 58, called, ‘An Investigation of Mottled Teeth: An Endemic (of) Developmental Imperfection of the Enamel of the Teeth, Heretofore Unknown in the Literature of Dentistry’. This article precipitated a response from other dentists around the country who were seeing a similar condition in children’s teeth; disfigured teeth which “materially injured the countenance of the individual” and created “intense self-consciousness and a bitter attitude,” as Black and McKay described it.

In 1917, McKay records an increase in goitres (an enlarged neck due to hypothyroidism) in these areas, says Jerry Tennant in his book ‘Healing is Voltage’. The prevalence of hypothyroidism in Colorado has since been confirmed in a study published in 2000 by E.G. Canaries. (1)

By 1925, McKay suspected that it was something in the water that was causing this type of poor teeth, but ‘just what was it’ that still had to be discovered. In 1925, E.G. McCallum et al, at John Hopkins University in America conducted a study called, ‘The Effect of Addition of Fluorine to the Diet of the Rat on the Quality of the Teeth’, and found that fluorine made teeth weaker.

Following on from McCallum’s work McKay published another article called, ‘The Relation of Mottled Enamel to Caries’ in the 1928, Journal of the American Dental Association, writing that he had also observed that tooth decay in these ‘defective’ enamel structures,

“...do not appear to show any greater liability to dental caries than do normal.”

It was this observation which was to spark a lot of future interest. (2)

Contributing to the idea, that fluoride was the cause of mottled teeth, was the work of a husband-and-wife team, Margaret and Howard Smith, who were leading scientists at the University of Arizona Agricultural Environmental Station. In 1931, they were concerned over people’s poor teeth in a neighbouring town where they found 7 ppm fluoride in the public water supply. They experimented by giving rats fluoridated water and found defects in the rats’ teeth. They warned that:

“Although mottled teeth are somewhat more resistant to the onset of decay, they are structurally weak; when the decay does set in the result is often disastrous.

If intake of fluoride (through drinking water) can harm the delicate enamel to such an extent that it fails to enamelise the unborn teeth in children, is there any reason to believe that the destructive progress of fluoride ends right there...? The range between toxic and non-toxic of fluoride ingestion is very small... Any procedure for increasing fluoride consumption to the so-called upper limits to toxicity would be hazardous.”

The defining moment came in 1931, when H.V. Churchill, Chief Chemist of the Aluminium Company of America (Alcoa), found a high level of fluoride near their factory in Bauxite in Arkansas, USA, where there was an epidemic of mottled teeth. Churchill had access to sophisticated technology, called photo-spectrographic analysis, to test water samples, which surpassed McKay’s testing equipment. Churchill renamed the condition of mottled teeth or Colorado Brown stain, ‘Dental Fluorosis’.

As has already been mentioned, there were some health concerns with mottled teeth. Frank McKay had found, as early as 1917, that in areas with 2.00- 2.5 ppm fluoride, there were more people with goitres. The very next year, in 1918, Professor Greves noted, that in Utrecht, Holland, where he lived at the time and where the water had a high level of naturally occurring fluoride, people were also afflicted with both mottled teeth and goitres.

Many scientists studying fluoride from 1931 to 1940 found that it was harmful to the human body in a number of different ways, and it was not only teeth that were weakened.

These scientists included H. Cristiani (1926,1930), H. V. Churchill (1931), H. Velu (1932), Frank McClure (1933), Boissevain and Drea (1933), P. F. Moller and Sk. V. Gudjonsson (1932/3), Floyd De Eds (1933 and 1936), Phillips et al (1934,1935 [2], 1936), D. Greenwood, (1940), Pandit et al (1940), Wilson and DeEds (1940) amongst others.

There were some doctors, however, who were recommending that fluoride may be able to cure certain ailments relating to bones. After all, fluoride had been found in teeth and bones and this could be important for their development and strength.

In 1892, Crichton-Browne even recommended fluorid food for pregnant women and for children for the purpose of counteracting caries.

Brissmoret had a similar idea with regard to the osseous (bony) system, and advocated a strengthening therapy with administration of calcium fluoride (CaF₂).

And in 1931, doctors Flemming Moller and Gudjonsson, were suggesting the possibility of treating bone diseases, found in workers at a Cryolite factory, with fluorine compounds – not realising that fluoride was the cause.

More on such ideas in Appendix 5.

It was Kaj Roholm, however, who became the world's leading authority on fluoride after publishing his monumental study called 'Fluorine Intoxication' in 1937. This work remains a 'great and lasting' study to this day. Roholm was Danish and became Copenhagen's Deputy Health Commissioner.

As a young man, full of passion for creating better health conditions, he pioneered the use of biopsy samples to study the human liver and was an expert in infectious and occupational diseases. In 1932, as a young doctoral candidate, Roholm was approached by the aforementioned Dr Flemming Moller to find the cause for a mysterious illness that had beset the health of workers in a chemical factory in Copenhagen. The factory was dealing with cryolite shipped in from the Danish colony of Greenland where there was an abundance of cryolite. Cryolite was in demand as a flux to help melt refined bauxite ore into a river of aluminium, and had become very profitable. It was cryolite dust that was filling the Copenhagen chemical factory air.

Roholm was rigorous in his quest to find an answer to this mysterious new disease and soon discovered that cryolite contains more than 50% fluoride. He conducted his own laboratory experiments, feeding fluoride to pigs, rats and dogs in order to study its biological effects. He listened to the factory workers and took X-rays. He finally found that, by swallowing (and inhaling) cryolite dust, fluoride gained entrance to the workers' blood where it then accumulated in the teeth, bones and 'quite possibly' their kidneys and lungs. Eighty percent of the workers had signs of osteosclerosis (hardening of bones), immobilised spinal columns and malformed knees and hips; some men even had thickened skulls. The workers' ligaments grew hard and sprouted bony spines, while their bones became lumpy and irregular in shape. Arthritic and rheumatic afflictions were commonplace, as were serious stomach problems, chronic skin rashes and pus-filled sores on their chests and backs, especially in the summer. Half the employees had a lung condition known as pulmonary fibrosis, and many suffered from emphysema-like afflictions.

Kaj Roholm also noted in his study that:

"The marked frequency of nervous disorders after employment has ceased might indicate that cryolite has a particularly harmful effect on the central nervous system."

He called the illness 'neurasthenia',

"a condition defined as 'an emotional and psychic disorder that is characterized by impaired functioning in interpersonal relationships and often by fatigue, depression, feelings of inadequacy, headaches, hypersensitivity to sensory stimulation (as by light or noise) and psychosomatic symptoms (as disturbances) of digestion and circulation".

He found,

"the workers' teeth were bad and the worst teeth had the most fluoride in them".

He also noted,

"that children who had never been inside the plant developed mottled teeth – evidence that mother and child had been exposed".

Roholm surmised that it was through breast milk, but it is now known that it passes through into the unborn child through the placenta membrane not through breast milk.

He stated that,

"It was discovered that the concentration of fluoride; 1 milligram of fluoride per 1 litre of drinking water (1 ppm); causes mottled teeth among those who drink the water, while the permanent teeth calcify, i.e. during infancy. The enamel becomes indistinct, chalk-like and sometimes dark coloured and fragile. The disease has since been discovered throughout the entire world and continues to be a serious problem of sanitary reasons, which makes it necessary to change the water supply."

Roholm found similar results to Frank McKay regarding caries and mottled teeth, for he states in his work, 'Fluorine Intoxication', on page 93, that:

"Fluorine has a detrimental effect on the growth of the teeth, whereby the part of a tooth calcifying during the period of fluorine intake will acquire permanent defects."

And, on page 33, he remarks that:

"Caries does not seem to be especially frequent in the moderately attacked [by dental fluorosis] teeth. Still, the enamel is more brittle than normal, is inclined to chip off, and fillings do not hold well."

He finally concludes that:

"The enamel organ (the tooth) is electively sensitive to the deleterious effects of fluorine," and recommends:
"Cessation of the therapeutic use of fluoride compounds for children."

Roholm doubted that fluorine was needed by the body, as doctors at that time, had speculated, writing on pages 312/3 of his study/book, 'Fluorine Intoxication';

"Sharpless and McCollum gave young rats a diet which, as far as possible, contained no fluorine. Growth and reproduction down to the third generation were not inferior compared with rats whose diet contained 0.001 per cent fluorine. The bones of the rats on the fluorine-free diet contained extremely small quantities of fluorine; in the teeth it was impossible to find the element. Otherwise, there was no definite reason for assuming that these particular tissues were deleteriously affected by the absence of fluorine."

He noted, on page 85:

"A series of rat experiments at Iowa Agricultural Experimental Station showed that, on a diet containing fluorine, the succeeding generations were less prolific than the first generation,....therefore, the use of phosphorite as a mineral supplement in animal husbandry may be regarded as abandoned, now that the toxic effect of fluorine has become known".

"The once general assumption that fluorine is necessary to the quality of the enamel rests upon an insufficient foundation. Our present knowledge most decidedly indicates that fluorine is not necessary to the quality of that tissue, but that, on the contrary, the enamel organ is electively sensitive to the deleterious effects of fluorine."

Roholm suspected it was fluorine's ability to poison enzymes that caused so much harm, saying:

"We must assume that the effect of fluorine on protoplasm and on enzymatic processes is capable of causing profound changes in the metabolism of the organism," adding that, *"The high toxicity of the fluorine compounds has led to their application as a rat and mouse poison. In most cases they are used in the form of sodium fluoride or sodium fluosilicate, which are effective."*

Kaj Roholm continued his investigations and travelled to places where he suspected that similar fluoride poisoning had occurred, and he read as much as he could find in the libraries of Berlin and London.

Slowly he realised that fluoride had always caused problems in the natural world. In Iceland, where the earth and vegetation had been contaminated with fluoride ash from volcanic eruptions, he saw crippled sheep with their teeth weakened. In the US he learnt, perhaps from Frank McKay and/or Frank McClure, that deep wells had been sunk by the early settlers and some were contaminated with fluoride. There the ugly tooth condition, initially known as Colorado Brown Stain or Texas Teeth, known now as dental fluorosis, was endemic. As well as in Texas and Colorado, this tooth condition appeared in South Dakota and Arizona.

He discovered that in India, China and Africa, dental fluorosis and crippling skeletal fluorosis was widespread because of drinking contaminated well water. The wells had often been dug deep by well-meaning charity workers.

Roholm also realised that, because fluoride had become essential for many manufacturing processes, it also presented a special threat to workers and the surrounding communities. He studied case after case where factory fluoride hurt workers and contaminated surrounding areas. Damage was found near superphosphate fertiliser plants, brickworks, iron foundries, steel, zinc and aluminium factories, chemical factories and copper smelters. He found the aluminium industry to be particularly contaminating.

Roholm felt, that the ill-health caused by 'smog' from coal burning, was due to the large quantities of fluoride frequently found in coal, rather than the sulphur compounds that other scientists suggested, because he reasoned, fluoride is so much more toxic, even in smaller amounts.

He also reasoned that the Belgium Meuse Valley air pollution smog disaster, on 30th December 1930, had been caused by fluoride from the nearby zinc, steel and phosphate plant, not sulphur. He calculated that tens of thousands of pounds of the chemical were spilled out each day from the local factories, etching windows, crippling cattle, and damaging vegetation. Citizens there were known for making lawsuits – it was 'a well-known phenomenon'. On December 30th, because of weather conditions prevailing at the time in the Meuse Valley, the smog descended leaving people and animals unable to breathe, killing 60 people and injuring thousands.

Roholm understood the difficulty for industry, because, although the damage from fluoride was widespread, information about its chemical cause was less available:

"The toxicity of fluorine compounds is considerable, and little is known in industry," he said.

He was also aware that industry required an outlet for the toxic fluorine waste compounds from superphosphate manufacturing. Having to neutralise such a large amount of toxic waste for safe environmental disposal was expensive and difficult. He noted that industry was considerably interested in fluorine's use as an 'insecticide for plants' among other things. He felt, however, that this rested on a 'slender foundation'.

Consequently, Roholm advocated government action:

"Factories giving off gaseous fluorine compounds should be required to take measures for their effective removal from chimney smoke. As fluoride poisoning was insidious and hydra-headed and that several groups of symptoms – including, stomach, bone, lung, skin and nervous problems – often presented themselves at different times in different people, making fluoride injury both serious and sometimes difficult to diagnose."

He recommended:

- Recognition of chronic fluorine intoxication as an occupational disease rating for compensation.
- Prohibition against employment of females and young people on work with fluorine compounds developing dust or vapour.
- Demanding that the industrial establishments should neutralise waste products containing fluorine.
- A prohibition against the presence of fluorine in patent medicine.

All this was not good news for industry in the USA, already overwhelmed with law-suits over fluoride emissions. They could be constantly liable for damages and making fluoride waste environmentally safe, by neutralising the acid through lime, was going to be difficult and expensive. In response to this growing concern from industry, a committee of lawyers was set up in the mid-1950s called 'The Fluorine Lawyers Committee'. Their task was to defend any litigation that resulted from fluoride damage. Robert A. Kehoe, Director of the Kettering Laboratory of Applied Physiology at the University of Cincinnati (a private toxicology laboratory), guided this group of lawyers. He had, in the past, defended fluoride on behalf of corporations that included Dupont, the Aluminium Company of America (Alcoa), and US Steel, all of which had already faced lawsuits for industrial fluoride pollution. It was Kettering Laboratory that produced a massive bibliography of abstracts on the soundness of communal water fluoridation, and fluoride's (beneficial) role in public health. With Robert Kehoe as the director, these abstracts were unlikely to be independent or unbiased. The Kettering report on the health benefits of fluoride was also funded by the National Institute of Dental Research and the fluoride-polluting heavyweight industries already mentioned.

Gerald Cox was to play a big role in helping industry, by assisting in changing fluoride's image from a poisonous past to a beneficial present. Cox was a biochemist from the Dental School at the University of Pittsburgh and was working in the Mellon Institute of Industrial Research at the University that was funded by Alcoa. Tasked with finding a way of improving tooth health, he experimented with rats with little success. But after the CEO of Alcoa, Francis Frary, suggested that 'fluorine might make strong teeth', Cox began new experiments. Cox's new experiments, in 1932, found that rat's teeth were better after being fed fluoride either in their food or drink, though this went against previous and later experiments on rats being fed fluoride.

It is interesting to mention here that Cox's later work in 1950, confirmed Kaj Roholm's experiments of 1930, where Roholm found that rats fed, *"on a diet containing fluorine, the succeeding generations were less prolific than the first generation,....therefore, the use of phosphorite as a mineral supplement in animal husbandry may be regarded as abandoned, now that the toxic effect of fluorine has become known"*.

However, in September 1939, Cox was proposing that America should consider adding fluoride to the public water supply. It was Cox's voice which was to be heard, and he was able to influence Public Health Officials, particularly Oscar Ewing.

Oscar Ewing was a top Wall Street lawyer for Alcoa who, between 1947 and 1953, became the Administrator for the Federal Security Agency – a forerunner of the Department of Health, Education and Welfare – in the Truman Administration. One of the first actions he took in his new, important role for the US was, in 1948, to allocate \$1 million for a nation-wide demonstration of the efficacy of 'topical' fluoride application (fluoride application applied to tooth surfaces by dentists in dental offices). In 1950, he was the person responsible for endorsing public water fluoridation for the 'Public Health Services' and, in 1957, he allocated \$2 million to promote water fluoridation nationwide. His previous work, interest and support of Alcoa meant that he was not impartial and was most probably biased towards the interests of big corporations. This history is fully explained in Christopher Bryson's book, 'The Fluoride Deception'.

It has been suggested by Chris Bryson that there were others who had a reason to hide the potential harm of fluoride prior to and during World War 2.

The scientists developing the atomic bomb, under the so-called Manhattan Project, required copious amounts of fluoride and were discovering that its lethal qualities were proving a problem for workers. Harold Hodge was a dentist tasked with finding the toxicity level of fluorine and other chemicals needed for the development of the atomic bomb and, for security reasons, was also tasked with suppressing this information from the general public. After the war, Hodge chaired the National Committee on Toxicology and was instrumental in paving the way and overseeing the first water fluoridation experiments/trials in the US, in 1945. Hodge insisted that at 1 ppm fluoride in a water supply there would be no adverse health effects other than for 10% of the population, receiving such water, would have mild dental fluorosis that he considered acceptable. (The other side of that perspective was that that 10% would otherwise have had better, stronger teeth had they not received the fluoridated water). As well as protecting the Manhattan project, Hodge was also protecting aluminium manufacturers, as aluminium was needed to make the many aircraft required for the war effort and aluminium production sent a lot of fluoride waste into the atmosphere.

However, in 1931, the Public Health Service of America, the newly expanded Public Health Service, was anxious to find a cure for the mottled teeth which had hit the headlines. Henry Trendley Dean, a chemist, was hired to find out about dental fluorosis. Dean hired Frank McClure, a toxicologist, to become part of his team. McClure was well aware of the harm at high and low levels of fluorine (F). He had just published an article, 'A Review of Fluorine and Its Physiological Effects'. (3)

To quote from his review:

"It appears that the level of the element (fluorine) must be kept at a very low level... Mere traces of F are known to exert a potent influence on the reactions of certain enzymes (as well as tooth formation)."

But he still wondered whether:

"Further investigation may reveal a specific role of F in certain changes necessary for normal cell metabolism." Others on Dean's team were Dr Philip Jay, Francis A. Arnold Jr. and E. Elov.

Dean et al toured 26 states of the US, 1933 -1934, taking water samples to measure the natural calcium fluoride (CaF₂) content. They found 375 known endemic areas of mottled teeth related to the fluoride content. His team checked children's teeth and decided, like McKay who also helped on the team, that poor mottled teeth showed no significant increase in caries (dental decay). But they also found some significant adverse health effects to bones, changes to haemoglobin, changes in nail structure and more frequent cataracts in high fluoride areas.

By 1937, however, the focus of Dean's studies had switched completely from the role fluoride had in mottled teeth to the role of fluoride in caries prevention, and he came up with the conclusion that fluoride at 1 ppm reduced dental decay with the only adverse effect being that 10% of children would have mild mottled teeth, hardly noticed by anyone. This he thought was acceptable. (4)

Dean and McClure knew of Roholm's work and that of other scientists warning of harm from low level F, even at 1 ppm F, but chose to dismiss these findings. *(From the viewpoint of modern epidemiology, Dean's studies were rather primitive, and have been criticised for the virtual absence of qualitative, statistical methods, their non-random method of selecting data and the high sensitivity of the results of the way in which the study populations were grouped.)* (5)

Dean and McClure were the paid scientists working for the Public Health Service (PHS) and it was their work that was to influence public officials. Dean later went on to organise and supervise the water fluoridation experiment/trial in Grand Rapids, Michigan, beginning in January 1945, months before the end of WW2, and

for his efforts, he was rewarded and appointed the first Director of the National Institute of Dental Research (NIDR) of the PHS, in 1948 and in 1953, he took a senior position with the American Dental Association.

The NIDR officials revered him as the 'father of fluoridation' but there were two other scientist that could have equally been given that title. One was David B. Ast, who worked for the Dental Bureau of the New York State Department. In the 1940s, he took time out to do a master's degree. In his thesis, in 1944, he outlined a plan for adding fluoride to public water supplies. Once back in the Dental Bureau in New York, he began to put his plan into action and gained the consent of two cities – Newburgh and Kingston – to trial water fluoridation. This trial began in May 1945, with David Ast as the senior organiser. The other person who could also be called the 'father of fluoridation' was Harold Hodge because, amongst other things, he supported and encouraged both Dean's and Ast's fluoridation Trials. He was so involved that he even convinced Ast to allow blood samples to be taken from Newburgh's children for use in his Manhattan Project studies although Ast stated later that he was not aware of 'blood samples' being taken and could not remember.

Both Dean and Ast insisted that their trials must run for 10 or 15 years in order to check for any adverse health issues.

Dr Ast wrote in the American Journal of Public Health, Vol, 40, June 1950,

"Final conclusions regarding the possible systemic effects of fluoride in the dosage employed should not be drawn before the termination of the 10-year study."

"More refined techniques may also be available in the future in studying pertinent aspects of the problem. It must be emphasised, however, that a longer period of observation is required before final conclusions can be drawn. The possibility of demonstrated cumulative effects of the fluorides in the final years of the 10-year study cannot be eliminated at this time". (6)

Yet two years later, in March, 1952, Dr Ast appeared before the Delaney Congressional Committee investigating fluoridation and testified that he was now wholeheartedly in favour of the immediate adoption of universal water fluoridation. He was asked by the counsel of the committee whether he thought the amount of fluorine that may be retained in the body, and not excreted, is an important consideration. Dr Ast replied,

"No, I don't think so." (7)

What had caused Ast to so quickly change his mind? Was it the influence of Harold Hodge the dentist from the University of Rochester, and toxicologist for the bomb project who was fully aware of fluorine's toxicity? Hodge had succeeded in convincing many people that diluting fluoride into a public water supply at low levels of 1 ppm was harmless to humans and would reduce tooth decay.

So after only 5 years into the WF Trials, and without proper scientific investigation, the roll-out of this practice began across America and elsewhere.

By clever twists and turns, the harm caused by low levels of fluoride was conveniently ignored or suppressed. Adding fluoride into water supplies on the assumption that it may benefit teeth seemed an excellent idea for both dentists and industry. The 'magical' or 'optimal' level in water became 1 ppm F. - *but no more*. (Note that at that time there was no other sources of F available e.g. fluoridated toothpaste with over 1,000 ppm F in a tube of paste, or gels, mouth rinses and fluoride varnish with a whopping 22,000 ppm).

The change to fluoride's image was so successful that Kaj Roholm, who visited the US for the first time in September 1945, shortly after the end of World War 2, noted that,

"the war had brought about a profound change in the understanding of fluoride", saying:

"In the United States it is common to associate fluoride as a less toxic element than previously known. In practice it is assumed that highly diluted solutions of hydrofluoric acid are not dangerous; this, however, to a great extent depends upon how long the influence is allowed to act."

He noted that, in 1944, the Department of Agriculture had even increased its maximum accepted contaminant level for fluoride in pesticides from 1.43 mg of fluoride per kilogram to 7 mg F per kg and was amazed to find that, in 1945, artificial fluoride at 1 ppm was being added to public water supplies in Grand Rapids, Michigan, and Newburgh, New York, for water fluoridation experiments/trials.

Roholm said on leaving the US in 1945,

"It will be very interesting to see the results within the next five to ten years."

While at the same time, he was so impressed with America and with Dean and McClure's enthusiasm for water fluoridation that he was prepared to be proved wrong. (8)

Unfortunately, Roholm did not get to see the results of the water fluoridation trials. On returning to Denmark, on 1st January 1948, he was appointed Professor of Public Hygiene at the University of Copenhagen. He gave his inauguration lecture to students in February and died of aggressive colon cancer in March of the same year, at the young age of 46.

(For results from the practice of water fluoridation in the US after 70 years, go to Chapter 10, Water Fluoridation Results, section - America. Roholm would certainly have found these results interesting. It turns out that his concern was valid).

Even as the fluoridation water trials began, Arthur Rabinowich, published a review in the Canadian Medical Association Journal April 1945 (Vol/page 52(4);345-90) reminding people of the corrosive nature of fluorine and fluorides but it had no effect on what was happening or was about to happen. Go to Appendix 11, to read Rabinowich's review.

The first water fluoridation trials

The first trials or rather experiments, to add a fluoride chemical to a water supply, began in American and Canadian towns in 1945

The planned 15-year trial of community water fluoridation was launched in four cities. Each fluoridating city was paired with a "control," a nearby city of similar size and demographic makeup, with a low-fluoride water source similar to that of the trial city.

The USA towns involved;

- 1) Grand Rapids, Michigan was to be fluoridated and paired with the neighbouring city of Muskegon as a 'control'; (plus Aurora, Illinois, as a naturally fluoridated city))
- 2) Newburgh, New York was to be the fluoridated city and was paired with Kingston as the 'control'.
- 3) Evanston, was paired with Oak Park

The Canadian towns involved;

- 4) Brantford Ontario was to be fluoridated and was paired with nearby Sarnia as the 'control'. (plus Stratford as a naturally fluoridated city). (9)

Aurora and Stratford were the two cities that had a natural fluoride content near 1.0 ppm and this served as a natural fluoridated 'control'. The study included these two cities to see whether artificially fluoride-adjusted water performed differently to naturally fluoridated water. As shown above Aurora, Illinois, was the naturally fluoridated control for the Grand Rapids–Muskegon trial, and Stratford, Ontario for Brantford–Sarnia. Schoolchildren in all participating cities received annual dental exams throughout the trial. The first trial began in January 1945, the second in May of that same year and by year's end, 232,000 Americans were receiving fluoridated tap water from their community water system.

Consent forms were required from parents with children for examination purposes, but other residents were uninformed, only learning about it from their local newspapers once the experiment/project had begun.

The public water supply became the vehicle for disposing of toxic fluoride waste. Fluoride waste would slowly be deposited into the environment effortlessly and cheaply, through the public water supply.

However, the American Medical Association, the American Dental Association and the American Water Works were all less than happy about this state of affairs.

In 1939/1940s, the American Water Works Association suggested that the safe level of fluoride in water should be lowered to 0.1 ppm to protect against dental fluorosis. This suggestion was ignored. (10)

On September 18th 1943, the Journal of the American Medical Association (JAMA), contained an article mentioning that,

"Fluorides are general protoplasmic poisons, probably because of their capacity to modify cell metabolism by changing the permeability of the cell membrane and by inhibiting certain enzymes. Sources of fluoride intoxication include drinking water containing 1 ppm or more fluorine."

And, on 1st of Oct 1944, The American Dental Association Journal (JADA), carried an article mentioning,

"The use of drinking water containing as little as 1.2 - 3 ppm of fluoride will cause such developmental disturbances in bones as osteosclerosis, spondylolysis and osteoporosis, as well as goitre, and we cannot afford the risk of producing such serious systemic disturbances in applying what is at present a doubtful procedure intended to prevent disfigurement among children. In the light of our knowledge, or lack of knowledge, of chemistry on the subject of fluorine, the potentialities of harm outweigh those of good."

Even in 1950, the United States Dispensatory, 24th Edition (1950), on Pages 1456-57, stated the following:

"... fluorides are violent poisons to all living tissue because of their precipitation of calcium. They cause fall of blood pressure, respiratory failure, and general paralysis. Continuous ingestion of non-fatal doses causes permanent inhibition of growth."

"Chemists agree that the element fluorine, head of the halogen group, is the most electro-negative of all elements, will combine with almost all elements to form various compounds, and that its greatest affinity is for calcium."

In spite of these warnings, the first trial/human experiment on WF began in 1945 and, after only five years, was heralded a success. (People, it appeared, could tolerate low doses of fluoride on a regular basis, for short period of time, without obvious symptoms of harm). Without any further studies or health studies, water fluoridation became commonplace throughout most of America and was soon introduced into many other countries around the world.

A new image is created for fluoride

Because of public resistance to fluoridation (as seen above) Edward Bernays, Sigmund Freud's nephew, was hired to change the image of fluoride, which was well known at that time, to be a poison. Bernays was well known as he had earlier written the book, 'Propaganda' in 1928, which was the first book to discuss ways of manipulating people, and populations. In this book he said that,

"people would believe anyone in a 'white coat or overall,'"

and with this in mind, he orchestrated the introduction of fluoride into toothpaste by advertising it as the new wonder ingredient for reducing cavities. With Harrold Hodge's help, dentists and doctors were soon convinced.

This helpful new image was to prove the key for the easy introduction of fluoride into public water supplies across America and around the world.

It is interesting to realise that the amount of fluoride in a 'pea-sized' squeeze of fluoridated toothpaste is equal to the amount of fluoride in an 8oz glass of fluoridated water.

In the US, fluoridated toothpaste packets have a warning written, in small print, that children should NOT swallow even a 'pea-sized' amount of the toothpaste. However, there is no such warning coming from water companies, health or dental officials about a glass of fluoridated water. (11)

Possible reasons why some early researchers were misled

Factors that may have distracted and influenced Dean, and his fellow researchers, McKay and McClure, apart from poor research methods, political pressure and financial gain are:

1) They were unaware of the slow eruption of teeth in fluoridated areas compared to non-fluoridated areas.

In fluoridated areas;

a) Young children had less teeth to count for decay.

b) Older children, with all their teeth, had less decay because their teeth, having erupted later, had less time to decay.

If this slow eruption of teeth in fluoridated areas (natural or artificial), is not accounted for, it invalidates any study. (12)

2) They were unaware of the difficulty of distinguishing between a mottled tooth and tooth decay.

Prof A. K. Susheela reminds us in her book, 'Treatise on Fluorosis', that dental fluorosis and dental decay should be easy to distinguish between but, when dentists have not been trained in this understanding and do not have the knowledge, as most do not, these two areas can easily become confused and blurred.

3) They were unaware of the microbiome of the mouth and that fluoride kills, or disables, all bacteria in the mouth, good or bad.

The step. mutans bacteria, now credited with producing the acid that causes teeth to decay, would have been practically eliminated in areas where mottled teeth, caused by excess fluoride, was endemic. To support this theory, G. Neil Jenkins, in his book, 'The Physiology and Biochemistry of the Mouth', suggests that,

"Fluoride conceivably exerts its anti-caries action by reducing the effectiveness of the bacterial enzymes (bacteria), which are responsible for the attack on teeth... The effect, although small, is consistent and statistically significant, and indicates enzymic (bacterial) inhibition in the plaque bacteria."

4) They were unaware that fluoride can reduce the size or alter the shape of the tooth.

The altered tooth shape reduces places where partly digested food can accumulate and turn acidic. Studies on human teeth formed in areas with varying fluoride intakes have shown they tend to be smaller than in controls and with shallower fissures (Ref: Lovius and Goose 1969). These differences were small and not always statistically significant but the overall tendency would be to reduce the size and number of places where food debris and plaque could accumulate. This effect would play some part... in the anti-caries effect of fluoride. The work of Prof G. Neil Jenkins, on animals, confirms this as he concluded,

“Animal experiments have shown that fluoride (and some other trace elements) taken during tooth formation may reduce the size or alter the shape of the tooth.” (13)

Also, the enamel and dentine are thinner... which would result in wider fissures and perhaps smaller teeth. (14).

5) They were unaware of the fact that fluoride increases saliva production, and it is saliva that helps to protect teeth.

Those weakened, mottled teeth that McKay observed in 1901, would have had some degree of protection from the excess saliva produced in the mouth by the ingestion of the very same fluoride that caused the weakened teeth in the first place. In Colorado Springs, USA, in 1901, the naturally present calcium fluoride (CaF₂) level in the water supply was between 2.0 – 2.5 ppm. This is more easily excreted from the body compared to hydrofluorosilicic acid (H₂Si F₆) or sodium fluoride (NaF) which will combine with calcium from within the body, reducing the calcium levels, before 50% of it is excreted.

6) They were unaware of, or did not take account of, the calcium levels in water supplies as it is calcium and other minerals that benefits teeth, not fluoride.

In the Newburgh and Kingston fluoridation trial the water supply of these two cities was different in minerals, not similar, as stated at the beginning of the trial. The higher calcium and magnesium content in the fluoridated city of Newburgh would have negated much of the damage done by fluoride. (15)

Then there was the opposite situation in the water fluoridation trial in New Zealand, began in 1954, which also proved the importance of minerals in the water. The town of Hastings was fluoridated and the town of Napier was the control. In fluoridated Hastings the young children had more tooth decay than Napier. However, by ages nine and ten, the tooth decay rate of the children from both cities were the same. The initial lower rates in Napier were attributed to higher levels of molybdenum and other minerals in their water. (16)

Professors S. P. S. and M. Teotia, of King George's Medical College, Lucknow, India, demonstrated that it was the calcium in the water that proved beneficial to teeth, not the fluoride. In a large randomised study of 400,000 children, published in 1994, it was found that those children taking a one-gram calcium tablet had higher bone density and 30% less tooth decay than their placebo counterparts. This study confirmed the importance of the mineral calcium for good bone and tooth health. (17)

However, Dean and his co-workers were seemingly aware of the possibility that minerals may play a part in caries prevention as in their first report on the Galesburg-Qunicy (Illinois) study, they wrote,

“While on the basis of our present knowledge it appears reasonable to associate the low caries rates observed at Galesburg and Monmouth with the presence of small amounts of fluoride in the domestic water, the possibility that the composition of the water in other respects may also be a factor that should not be overlooked”. (18)

Dean chose not to pursue this avenue of research.

7) They were unaware of the real drinking habits of children, and the culinary implication re: WF.

The one part per million (1 ppm) concentration of fluoride to be added to the water supply, was established by the National Institute of Dental Research from the work of McClure and company. McClure estimated that the daily water intake in children averages about 4 glasses, and this would provide them with 1 mg of fluoride ion per day and would result in 10% of the children having mild dental fluorosis. However, later research proved this to be incorrect and found that children consume, on average, less than one pint of water per day, some as little as two ounces, such that they would not receive the recommended dose of fluoride through drinking water upon which the fluoridation hypothesis rested. (19)

However, despite this miscalculation, McClure and company did not fully consider that fluoridated water would be one of the important ingredients in a large number of culinary preparations such as rice, bread, cereals, legumes, reconstituted milk and other drinks, and that this fluoride would be added to the fluoride

already naturally present in these foods. As a result, the total daily intake of fluoride would quickly increase far beyond their original intentions. And this was before, and without, all the fluoridated dental products that were soon to appear in the market place and before the fluoridated treatments in the dental clinics. (20)

8) They were not medical doctors.

However, McKay had recorded, in 1917, an increase in 'goitres' in Colorado Springs and Dean had noticed an increase in 'cataracts' in other naturally fluoridated areas.

"By 1938, Dean and McKay were well aware of the serious side effects of fluoride but they may have contented themselves with the idea that they were occurring at higher doses than those causing dental fluorosis in the communities they was studying. They were taking a 'gamble' that drinking water at 1 ppm fluoride, which they knew could change and damage growing tooth cells, would not harm any other tissue in a child's developing body and would not cause any injury to adults after a lifetime of exposure." (21)

The whole case, for fluoridation (WF) is that there is less dental decay in children, of the same age, living in fluoridated areas.

From the viewpoint of modern epidemiology, Dean's studies, showing that there was less dental decay in areas with 1ppm natural fluoride, were rather primitive, and have been criticised for the virtual absence of qualitative, statistical methods, their non-random method of selecting data and the high sensitivity of the results to the way in which the study populations were grouped. (22)

Dr Dean, twice confessed in court, that statistics from the early studies allegedly supporting the use of fluoridation in community water systems, were invalid according to standards, which he himself set up.

F. A. Arnold, Jr., D.D.S. (Director of Dental Research, USPHS) a fluoridation promoter, while under oath at Oroville, California, in October 1955, when asked if he believed fluoridation was safe, acknowledged that he had no proof of its safety; that he

"couldn't possibly have". (23)

And Dr Harold Hodge a leading promoter of fluoridation in the 1940/50s admitted, 25 years later, in an obscure paper, *Professor*, 1979, that he had been wrong to suggest that it would only take a massive dose of fluoride to cause harm.

In conclusion, Professor Paul Connett said,

"Researchers did not have solid evidence to demonstrate either the short-term or the long-term safety of this practice, before commencing to roll out water fluoridation across the. US".

Summarising: from mottled teeth to water fluoridation and fluoridated products

In 1901, a young dentist in Colorado, US, is concerned to find that 80% of children in his practice have unsightly, mottled, weakened teeth, later called Dental Fluorosis when it is finally discovered that fluoride, calcium fluoride, in the drinking water, at 2-2.5 ppm, is the cause of this condition.

Fluoride is well known to be a poison, though some doctors prescribe fluoride as a medication to cure certain conditions.

The aluminium company of America, Alcoa, hopes that fluoride can be used as a cure, as it has a lot of waste fluoride to dispose of from the production of aluminium. A director of the Alcoa company, suggests to a researcher that fluoride could be good for tooth enamel and that this is worthy of investigation. Thus begins the conflict of interest between genuine science and industry that goes straight to the heart of the US' government, and at a time when a former lawyer of Alcoa, becomes the Health Minister.

Alcoa, along with other polluting industries, contributes funds to the Fluorine Lawyers Committee and to Kettering Laboratories, to find beneficial uses and excuses for fluoride in cases of litigation.

Dean, the chemist, is hired by the Public Health Service in 1931 to find a cure for mottled teeth and, strangely, ends up finding a use for fluoride, though he twice confesses in court that statistics from the early studies, allegedly supporting the use of fluoridation in community water systems were, invalid.

Atomic bomb production in the 1940s, during World War 2, requires copious amounts of fluoride, as does the production of aluminium for building aircraft, and the issue around the disposal of the resulting toxic fluoride waste is hidden from the public gaze, perhaps on the basis of secrecy.

Edward Bernays, who wrote the book, 'Propaganda' in 1928, is hired to convince the public of fluoride's safety and so begins the myth that dominates to this very day – the myth that fluoride is good for teeth.

Chapter 5 References

- (1) (Ref: E.G. Canaries et al. 'The Colorado thyroid disease prevalence study' in Archives of Internal Medicine 2000, 60:526–5 34).
- (2) (Ref: McClure's book, 1970, Page 80 and 'Journal of the American Dental Association', 1928, Volume 15, No 8).
- (3) (Ref: Pub. in Physiological Reviews Vol XII July 1933, no 3).
- (4) (Ref: Fluoride Wars, Page 101) (but was this ethical causing 10% of the child population to have weakened teeth?)
- (5) (Ref: Diesendorf, M. Commum.Hith Stu. 4 224-230(1980).
- (6) (Source: The Truth About Water Fluoridation by Charles E Perkins).
- (7) (Source: The Truth About Water Fluoridation by Charles E Perkins).
- (8) (Ref: Page 300 of Chris Bryson's book).
- (9) (Source; Centre for Disease Control and Prevention – [cdc.gov/fluoridation/basics/timeline.html](https://www.cdc.gov/fluoridation/basics/timeline.html))
- (10) (Ref: 'The Case Against Fluoride', Paul Connett and co-authors, Page 80).
- (11) (Ref: Dr Bill Osmunson: https://www.youtube.com/watch?v=L0S3E6RWspc&feature=emb_logo) and (Ref: Video link by David Kennedy 13 mins – Fluoride Damage: https://www.youtube.com/watch?v=AeOJ_2m7P1I)
- (12) (Ref: Barry Groves, Second Opinion).
- (13) (Ref: 'The Physiology and Biochemistry of the Mouth pub.1954/5th edition 1978 by Neil Jenkins).
- (14) (Ref: Kruger 1961,1962, 1968,1970).
- (15) (Source: 1952 U.S. Geological Survey).
- (16) (Source; George Waldbott's book, 'Fluoridation the Great Dilemma' page 191).
- (17) (Refs: Teotia SPS, Teotia M. 1994. Dental caries: a disorder of high fluoride and low dietary calcium interactions (30 years of personal research). Fluoride. 27(2):59–66. Full study at: <http://www.fluoridealert.org/re/teotia-1994.pdf>)
- (18) (Source: 'Fluoridation the Great Dilemma', by George Waldbott, page 190).
- (19) (Source: Waldbott's, 'Struggled with Titans', page 127).
- (20) (Source: FluorideFreeCanada's newsletter 15th March 2023, Issue 19.)
- (21) (Ref: 'The Case Against Fluoride', page 67 and 73, by Paul Connett and partners)
- (22) (Ref: Diesendorf, M. Commum.Hith Stu. 4 224-230(1980).
- (23) (Source: Fluoridation and Truth Decay by Caldwell and Zanfagna, page 229)