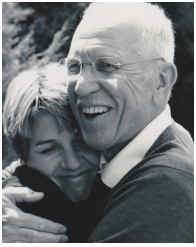


A Colorado Story

By James H. Pearce, D.D.S.



The year was 1901 when a young dentist from Massachusetts, with a recent diploma in hand, arrived in Colorado Springs to begin his career in dentistry. His name was Dr. Frederick S. McKay and he would become one of the most celebrated and honored dentists in history—receiving awards, citations and honorary degrees from professional and scientific organizations and universities from coast to coast.

Dr. McKay spent his childhood in Milford, Mass., attending school, working in his father's dry goods business and playing in local bands. Suffering from suspected tuberculosis, he journeyed at age 16 to Colorado seeking the health benefits of clean, dry air and sunshine, as did so many other TB patients of that day. After numerous odd jobs in Colorado Springs, he returned to Massachusetts where he found employment as a streetcar conductor.

Encouraged by his dentist brother-in-law to seek a professional education, he entered Boston Dental College (later Tufts University School of Dentistry), then subsequently transferred to Pennsylvania University where he received his dental degree in 1900.

Once again, his health problems drove him west to Colorado Springs where he began practice as an associ-

ate dentist for \$75 per month. Before long, Dr. McKay became curious about the large number of patients who exhibited a strange discoloration of their teeth: a brown stain sometimes so severe that it resembled the color of chocolate. Unable to find any information in the literature concerning this condition, Dr. McKay went to the newly formed El Paso County Odontological Society (precursor of the Colorado Springs Dental Society), and pressed the members to investigate the issue and to undertake a survey to locate other stain-afflicted areas. Letters were sent to dental offices throughout the Rocky Mountain area but little came of the survey and interest waned.

Three years later, in 1905, Dr. McKay left for St. Louis, Mo. to pursue a degree in orthodontics. Upon his return to Colorado Springs, he resumed his efforts to identify this condition now known as the "Colorado Brown Stain," a title that disturbed the city leaders trying to attract tourists to the area. In December of 1908, funded by a grant of \$21 from the Colorado Springs Dental Society, a committee of three dentists undertook an extensive examination of the public school children. Upon inspecting the teeth of 2,945 students, they were astounded to discover that 87.5% were afflicted to some degree and that all of those afflicted were native to Colorado Springs and vicinity.

Curious about this anomaly of the enamel, Dr. McKay contacted

Dr. G.V. Black of Northwestern University, the leading scientist in dental histology, for help. Letters were exchanged wherein Dr. Black stated that he was skeptical that such a condition of this magnitude could go unreported in the journals and initially doubted the accuracy of Dr. McKay's reports. Dr. Black's interest was sufficiently aroused, however, by the survey results. After examining samples sent to him, Dr. Black agreed to travel to Colorado Springs for the 1909 meeting of the Colorado State Dental Association. At the meeting he presented a lantern slide program entitled, "Developmental Faults in Enamel and the Resulting Brown Stain,"—recorded by the association's secretary as the finest lecture ever heard by a group of Colorado dentists.

Dr. Black continued his study of the stain for another six years until his death in 1915, but the stain's cause remained a mystery. Those studying the stain also noted a secondary observation: the stained teeth were almost invariably and inexplicably resistant to dental decay. For some unknown reason this fact seemed to be of much less interest to the investigators but would be of enormous importance in the world of preventive medicine.

After the death of Dr. Black, Dr. McKay remained interested and he carried on the study almost single-handedly for the ensuing 15 years, largely at his own expense. Theories

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regarding the cause of the staining included eating too much pork, radium in the teeth, substandard cow's milk and too much calcium in the water. Dr. McKay leaned toward water as the causative agent, but analyses of the water failed to produce any meaningful results. A breakthrough happened when Dr. McKay learned of another community with the brown stain. He traveled to Bauxite, Ark., a company town belonging to the Aluminum Company of America (ALCOA), confirmed the enamel mottling and published a paper.

His report came to the attention of the chief chemist for ALCOA, Dr. H.V. Churchill at company headquarters in Pennsylvania, who found it most interesting because he had been busy refuting claims that aluminum cookware was dangerous, thus damaging the reputation of ALCOA. Dr. Churchill began an investigation of the water in Bauxite utilizing photospectrographic analysis, a more sophisticated technology than that available to Dr. McKay. Upon discovering a surprising level of fluoride in the water, Dr.

Churchill sat down and wrote a five-page letter to Dr. McKay outlining his findings. This was the seminal moment for identifying the causative agent of mottled enamel or the "Colorado Brown Stain" and the beginning of an answer to Dr. McKay's 30-year search.

This revelation also attracted the attention of Dr. H. Trendley Dean at the National Institute of Health (NIH) who began testing water to determine at what level of fluoride

content the discolorations began. Assisted by the NIH chemist, Dr. Elias Elvove, he concluded that a risk of fluorosis began when fluoride levels exceeded 1 part per million. Dr. Dean then turned his attention to the low incidence of tooth decay as reported by Black and McKay in *Dental Cosmos* in 1916 and was eager to learn if fluoride in water was



Dr. Frederick S. McKay

the agent providing protection from dental caries.

Support for his theory depended upon a large-scale study that Dr. Dean proposed to conduct in Grand Rapids, Mich. by adding fluoride to the city's water supply and observing the teeth of the children of Grand Rapids. Following many discussions with the city council, the Michigan Department of Health and other public health organizations, the project began in 1945. Over a period

of 15 years, the results came back demonstrating a 50% to over 60% reduction in dental caries in teeth of schoolchildren, rewarding Dr. Dean for the years invested in this research project.

More studies followed in the communities of Evanston, Ill. (with Oak Park as the control) and Newburgh, NY (with Kingston as the control) supporting the efficacy of fluoride in caries abatement. International interest led to studies in Canada, New Zealand, the Netherlands and the U.K., all confirming Dr. Dean's hypothesis.

The determination and perseverance of Dr. McKay, combined with the devoted efforts of Dr. Dean, culminated in one of the most important public health innovations in the history of mankind. And it all started in COLORADO with one man's curiosity and persistence in pursuit of his goal in the face of much apathy and adversity. This curious and undeterred dental scientist, recipient of multiple awards and honorary degrees from many prestigious institutions, Dr. Frederick S. McKay, died in 1951 at age 85.

Much of the information in this article came from "A History of Dentistry in Colorado 1859-1959" by William A. Douglas (copyright 1959), from "The Story of Fluoridation" by The National Institute of Dental and Craniofacial Research and from "Dr. Frederick S. McKay" by The Pierre Fauchard Academy.

A former editor of the Colorado Dental Association, Dr. James H. Pearce, Jr. was the CDA president from 1986-1987 and served on the ADA Board of Trustees from 1991-1995. He can be contacted at pearce1041@cox.net. 