THE CAUSE OF MOTTLED ENAMEL

MOTTLED enamel, a tooth defect first reported in the United States by Messrs. G. V. Black and F. S. McKay[1] in 1916, is wide-spread. A recent Public Health Report[2] by Kempf and McKay shows mottled enamel to exist in districts in Colorado, Texas, Virginia, Arizona, Italy, Holland, China, Mexico, Spain, Argentina, Cape Verde Islands, Bahama Islands and other South American and South African countries. Other centers have been reported recently in Illinois, North Dakota and Minnesota.

Mottled enamel is usually characterized by dull white or "paper white" patches scattered irregularly over the surface of the tooth. In some cases the whole tooth surface shows this dead white, unglazed appearance. In many cases the enamel is badly pitted. Mottled teeth probably erupt with the intercementing material absent. They may or may not become stained later.

From experiments in progress in the nutrition laboratory at the University of Arizona it appears evident that the causative factor of mottled enamel lies in the water supply of the afflicted communities, a view long since held by McKay. By several lines of evidence in our laboratory the destructive action of the water upon the developing enamel of the teeth has been shown to be due to its content of flourine. A condition resembling mottled enamel has been produced in the incisors of rats by the use of water obtained from St. David, Arizona, an endemic community. This water was reduced to one eighth of its original volume by evaporation and given to rats to drink. Water residues were incorporated in the rations of other rats. In both cases a defect of the teeth was produced which was similar, if not identical, to that condition produced in litter mates by the addition of sodium flouride to their ration. The teeth were chalky white, and in many cases decidedly pitted. An abnormal effect in the structure of rats' teeth produced by the feeding of sodium flouride was demonstrated in 1925 by McCollum and his coworkers,[3] but was not at that time associated with mottled enamel. The incisors were reported to be abnormal in color, the orange tint normally seen on their anterior surfaces being nearly absent.

Quantitative analysis of the water from St. David and other afflicted communities has shown a high content of flourine as compared with but small amounts present in the waters of neighboring unaffected regions.

Geologic relations to water supply are being investigated. The finding of prehistoric animals of the late Cenozoic age (mastodons) the tusks and bones of which are unusually high in calcium flouride suggests a possible source of enrichment of the water in flourine in that community. The deposit of cryolite (Na_3AlF_6) on Pike's Peak suggests the source of contamination of the water supply of Colorado Springs, another community in which mottled enamel is endemic.

Gautier[4] has analyzed waters from many different sources for flourine and has shown that waters in volcanic regions, waters produced eruptively and so-called mineral waters contain higher concentrations of flourine.

The relation between the degree of mottling and the concentration of flourine in the drinking water supply of humans is being investigated.

There is some evidence in the author's laboratory to show that certain types of dietary inadequacies make the destructive action of flourine containing waters more pronounced.

Work upon all these lines is being actively pursued.

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RELIC OF AN EARLY AERIAL POST

QUOTING from the Encyclopedia Britannica, eleventh edition, vol. 1, p. 264:

> The first balloon voyage across the English Channel was accomplished by Jean Pierre Blanchard (1753–1809) and Dr. J. Jeffries, an American physician, on the 7th of January, 1785. . . . In their channel crossing Blanchard and his companion, who started from Dover, when about one-third across found themselves descending, and threw out every available thing from the boat or car. When about three-quarters across, they were descending again, and had to throw out not only the anchor and cords, but also to strip and throw away a part of their clothing, after which they found they were rising, and their last resource, viz., to cut away the car, was rendered unnecessary. As they approached the shore, the balloon arose, describing a magnificent arch high over the land. They descended in the forest of Guinnes.

It may be added that a fine monument has been erected at the spot where they landed.

On this journey from Dover Dr. John Jeffries wrote a card to his friend, Mr. Thayer, and dropped it before passing from the English coast. This yellowed and stained bit of early aerial post has recently come into the possession of the Snell Museum of

[1] G. V. Black and F. S. McKay, "Mottled Teeth," *Dental Cosmos*, June 16, 1916.

[2] G. A. Kempf and F. S. McKay, "Mottled Enamel in a Segregated Population," *Public Health Reports*, 45, p. 2923, 1930.

[3] McCollum and coworkers, "The Effect of Additions of Flourine to the Diet of Rats on the Quality of Their Teeth," *Jour. Biol. Chem.*, 63: 553, 1925.

[4] A. Gautier and P. Clausmann, "Le Flour dans les Eaux Minerales," *Compt. Rend. Acad.*, 158: 1631, 1914.