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DENTIFRICE

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Our invention relates to a new type of dentifrice which can be characterized as a completely edible and nutritious tooth food and tooth cleanser, having properties favoring its impaction in tooth crevices and whose decomposition by mouth organisms or by like mechanisms favors the production in the mouth of alkaline products.

In spite of every extensive use of toothpastes and widespread tooth cleaning propaganda, dental caries continues to remain a major disease in the population.

Recent researches indicate that dental caries is a chemical dissolution of the calcium phosphate salts which constitute essentially the tooth enamel. When caries attacks the enamel the entire carious area is dissolved because there is so little organic matter in enamel that it can not maintain its form and so a cavity results. The initiation of caries appears chemically to be a dissolution of the lime salts. A similar effect can be produced by dilute acids and therefore caries is generally thought to be due to the organic acids produced by decomposing food debris.

Recent important advances in our knowledge of the effects of acids on enamel show that lactic acid solutions from pH 4.0 to 8.0 are able to etch the enamel. This etching effect may be eliminated by adding calcium and phosphate ions to the solution. When the solution becomes saturated with calcium and phosphate ions the enamel no longer is dissolved even in buffers having an acidity as low as pH 5.0. The supersaturated condition of the saliva with respect to calcium and phosphate ions protects the enamel from decalcification by organic acids such as lactic acid. It is only in secluded areas about the teeth where the calcium and phosphate ions in the saliva may not freely flow to neutralize local high concentrations of organic acid, where tooth decay continues to work havoc.

In recent years it has become well established that inclusions of calcium and phosphate in the diet play an important role in the development of excellent tooth structure and in the aiding of the arrest of the carious process. Accordingly, the problem of prophylaxis of dental caries is dependent not only upon the neutralization of tooth destroying acids but also upon proper dietary fortification, especially with respect to calcium and phosphate. Effective neutralization can not be accomplished by the transient introduction of soluble chemical alkalis applied during the short period of tooth brushing. The same

consideration holds for the transient effects of antiseptics designed to destroy the germs which produce the acids. And finally, toothbrushing itself can not effectively remove debris from those hidden crevices about the teeth where tooth decay usually begins.

The objects of our invention are as follows:

1. To provide a combination of edible substances containing a high concentration of calcium and phosphate and capable of serving as a vehicle for other nutrients such as vitamins and minerals, such as are essential for tooth development and well being; and so designed that when introduced into the mouth the same factors which favor impaction of food in teeth will favor the impaction of our edible dentifrice. The base of our dentifrice is an edible colloid which will aid in the impaction and holding in place about the teeth of the slowly soluble calcium and phosphate. In this respect our invention is unique in that it differs from the general class of dentifrices by providing a completely edible food product supplying calcium and phosphate at buffered pH values to prevent accumulations of tooth-destroying acids. This calcium and phosphate is contained in a medium favoring impaction in just those areas where tooth destroying acids are produced; namely, in caries susceptible areas in hidden tooth crevices, hence in these susceptible areas our invention offers the same or greater protection in respect to calcium and phosphate than is available to those surfaces of teeth where saliva flows freely.

2. It is a further object of our invention to provide in our dentifrice as the edible bases aiding in the impaction of calcium and phosphate about caries susceptible areas, substances whose chemical composition are such as to favor the growth about these caries susceptible areas of organisms which will produce alkaline products when acting on the edible bases contained in our dentifrice, and at the same time provide a medium unfavorable for the growth of mouth organisms which produce acidity. Such edible bases consist of the groups represented by animal and vegetable protein and nitrogenous materials, and the like.

3. A further object of our invention is to provide in the same dentifrice which supplies buffer or neutralizing capacity to hidden tooth crevices as above indicated, a food unique in that it is designed specifically to supply when ingested those elements essential for adequate tooth development and well being; such essential elements being especially calcium and phosphorus.