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Dental Caries

# Ontario Department of Agriculture

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WOMEN'S INSTITUTE BRANCH

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BULLETIN 204

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## Decay of the Teeth

Its Cause and Prevention

By A. A. Stewart, L.D.S., D.D.S.

Prepared under the direction of the Educational Committee  
of the Ontario Dental Society

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# Ontario Department of Agriculture

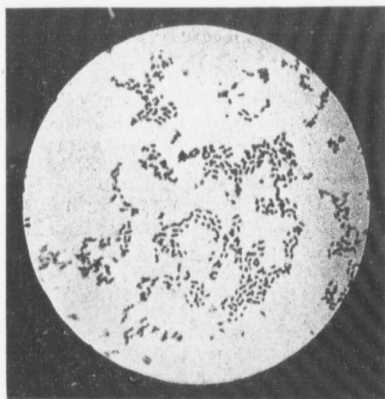
WOMEN'S INSTITUTE BRANCH

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## Decay of the Teeth

ITS CAUSE AND PREVENTION.

A popular impression has long existed that caries, or decay of the teeth, is of comparatively recent origin, and that it is due to an artificial mode of life in a departure from the laws of nature, and to artificial environments. It has been held that our early progenitors knew not the



Germs of tooth decay.  
(Magnified 1,000 times.)

pains of toothache, and retained their dental organs to a late period in life. Actual observation has proven this to be untrue, as the study of the skulls of mummies has shown that man in all ages has suffered from the ravages of caries to a greater or less degree. It is a disease which is as old as the human race, and has probably caused more pain and distress to the human family than any other disease with which man is afflicted.

It would naturally be expected that a condition so universal in its extent so ancient in its origin, and so distressing in its results, would have been carefully studied and long since understood. The fact really is that until within the last thirty years, or even less, no successful steps were taken toward a study of the cause and prevention of the disease. Much dental work was done, and many good results obtained, but the results obtained were to remedy this evil, rather than to discover the cause, and prevent the decay.

The cause is now definitely known, and much work has been done along remedial lines, and with very good results. It has been demonstrated that dental caries is due to a number of factors, but the principal and basal one is the growth of oral bacteria. The bacteria during their growth produce an acid (lactic acid), which is the destructive agent in the disease.

Bacteria belong to the vegetable kingdom, and are in many respects analogous to the higher plants. They are not, as they are so frequently spoken of, microscopic animals. There are many of them which serve a useful purpose, just as the higher forms of the vegetable kingdom do, and they all should not be looked upon as disease-producing. Only a comparatively few varieties have been studied and classified. A vast number may be looked upon as useless, since investigation has been unable to discover any office, useful or otherwise, which they perform.

In the human mouth, there are many forms of bacteria that are so commonly found that they may be looked upon as being almost indigenous. Among those forms found more or less constantly in the mouth are those which produce lactic acid under favorable conditions, under other conditions they entirely fail to develop. Thus it is seen that for the production of decay we must have conditions prevailing which make the bacteria effective. Those conditions are moisture, a desirable soil, or food in which to develop, and a certain amount of heat. In the mouth we have always present two conditions, moisture and warmth, and in many cases the third.

The various foods, particularly the starches, are, by the ferments of the mouth, changed into forms admirably suited for the growth of these acid-producing bacteria. In the pits of the teeth, or in any of the irregularities of their surfaces, or between the teeth, food lodges. This provides nourishment for the bacteria, which, in their growth, split up the sugars and starches, building up into their own substances such elements as are necessary for their growth, and leaving others, and at the same time giving off, or excreting, certain by-products, among which is lactic acid. This acid, which is particularly active in its newly-formed state, attacks the calcic, or lime salts of the tooth. The enamel, being largely composed of these salts, is dissolved, thus causing a large depression. These bacteria in their development protect themselves by a gelatinous material which they give off, and by means of which they become attached to the surfaces of the teeth. Under cover of this, the process is continued, lactic acid is constantly formed, and the tooth tissue is gradually dissolved until

the central portion of the pulp, commonly called the nerve of the tooth, is reached.

When the disease has reached the pulp, or occasionally before it reaches it, we have a condition known as pulpitis, or ordinary toothache. This is simply an inflammation of the pulp. The usual symptom is severe pain, which is increased by the application of heat or cold, but particularly cold. This may be temporarily relieved by the patient himself simply washing out the cavity with warm water, and applying oil of cloves, creosote or any anodyne on a pledget of cotton, and covering it with another piece of cotton. He should see his dentist as soon as possible afterwards.

The next step in this disease of the tooth is the destruction of the pulp itself. The pulp, as a result of these bacteria, becomes disintegrated and putrescent. If any of this material, which is filled with bacteria, passes through the end of the root we have another condition set up. Gases form and cause pressure and irritation, and there is a general inflammation around the end of the root with pus forming. The tooth feels longer than the others, is sore to pressure, great pain is caused by the application of heat, and it is relieved by cold. This is commonly spoken of as an abscessed tooth. Relief can only be given in these cases by cleaning out the cavity and opening up the tooth so as to allow the pus to escape. This can be done by the dentist, and a patient will get very little relief until he consults one.

There are many conditions of the tooth and mouth which are secondary causes of decay, enabling the bacteria to produce these disastrous results.

1. The first and most important is the general care taken of the teeth by the individual.
2. The food eaten.
3. The use given the teeth, i.e., people who masticate their food well, and eat food that requires thorough mastication, are less subject to caries.
4. Irregularities of the teeth; teeth that are irregular, and are not in the relation to each other that nature intended them to be, are more susceptible to decay.
5. The general health of the patient; on this depends largely the number and variety of bacteria in the mouth.
6. A hereditary tendency to caries.

#### THE DENTIST NEEDS THE CO-OPERATION OF THE PATIENT.

We have now the cause of decay briefly defined, and knowing the cause, what is the remedy?

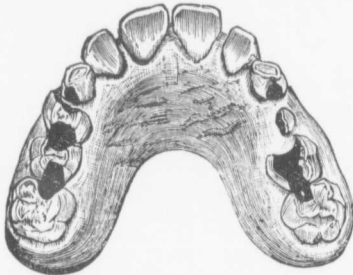
Many people; too many, leave the care of their teeth entirely in the hands of the dentist, and do not follow closely any of his instructions. Others, and by far the greater number, take absolutely no care of their teeth, until they have lost many of them, and are in danger of losing

all. They then rush to the dental practitioner, demanding that he save the remaining teeth, a thing which, in many cases, is impossible.

A dentist who has not the co-operation of his patient from the very beginning cannot produce the best possible results. He may do excellent work, but unless the patient assists him, he cannot hope to prevent a recurrence of caries, but simply postpones the time when the teeth will be lost.

#### ABSOLUTELY CLEAN TEETH DO NOT DECAY.

What can be done? The answer is very simple, and is based on the assertion that an absolutely clean mouth will be absolutely free from caries. As it is impossible, however, to obtain this condition of absolute cleanliness, we have to be satisfied with as near an approach to it as pos-



Caries in Temporary Molars, by which the Permanent Molars have been affected.

sible. The degree of cleanliness attained will determine largely the extent to which caries will exist.

In the mouth it is possible to control, in some measure, the rapidity with which bacteria develop. This can be done by antiseptic mouth washes, but only to a limited extent. But one should not depend very largely on this. It can be readily shown that thorough mastication reduces the number of bacteria in the mouth. By the act of vigorous chewing they are brushed off the teeth, and out of their resting places, are mixed with the masticated food, and carried into the stomach to be destroyed by the acid of the gastric juices. After a meal, particularly one which consists of food requiring prolonged mastication, bacteria will be found much less abundant than before the meal. If, however, the mouth is well cleansed, and carefully freed of all food particles immediately after the meal, the increase of bacteria is greatly lessened; and, if the saliva is normal, and the teeth and mucous membrane are in a healthy condition, the development of bacteria will be greatly retarded.

If starchy food, like bread, crackers, etc., is allowed to remain in the mouth, it will greatly assist the development of acid-producing bacteria. The same effect is also produced by saccharine foods, such as sugar, candy, and other sweets. This leads to the conclusion that keeping the mouth clean by frequent and careful removal of food, retards the growth of bacteria, because it reduces the soil in which these microscopic plants develop. When the mouth is kept free from starchy and saccharine foods, it deprives these acid producers of the elements needed for their growth.

#### CLEANLINESS OF THE TEETH PREVENTS OTHER DISEASES.

Besides protecting the teeth, such cleanliness reduces the likelihood of acquiring diseases. It is evident that, if disease germs enter a neglected



Pleasure in Cleaning the Teeth.

mouth and mucous membrane, where food particles in all stages of decomposition abound, serving as a soil for their development, they will grow in number, and in virulence, much more rapidly than in a clean, well-cared for mouth. A clean mouth is one important safeguard against disease.

It will be naturally suggested that, if decay or caries of the teeth is the result of an acid, why is the remedy not an alkaline mouth wash?

Here we are confronted with one of the apparent contradictions in bacteriological study. Acid-producing bacteria develop best in an alkaline medium, and cease to grow when the substance in which they are growing becomes more than one half of 1 per cent. acid. They are victims of their industry, and are killed by the acid which they produce.

Acid saliva is met with only occasionally, and is not usually accompanied with any marked carious action. Therefore, an alkaline tooth-wash, useful though such a preparation may be, cannot be looked upon as a much-sought-after agent that will eliminate caries from the catalogue of human ills.

As has been said before, the organisms are attached to the teeth by means of a gelatinous material which they throw out around themselves. They reproduce under this covering, and thus the acid which is formed in the process of their growth is concentrated, and acts very rapidly on



The Result of Neglect in Care of Teeth.  
Not healthful nor pretty.

the teeth. These gelatinous coverings may be readily removed, but are usually located on a part of the tooth difficult of access. The abrasion of mastication will remove them, unless in a protected part of the tooth. As saliva has the property of penetrating this covering, the bacteria in this way obtain their food.

#### TEETH SUFFER FROM LACK OF EXPERIENCE.

The teeth in a general way suffer from lack of nutrition, and lack of exercise. In addition to this they suffer from lack of surface polish, which would make them more resistant to carious action. When it is said that the decay of the teeth is brought about by civilization, it is not intended to assert that caries was unknown among the uncivilized people,



for, as has been said previously, caries has been known in all ages. But any observer will gather from a study of skulls of different races, and of different ages, that civilization has a great deal to answer for in regard to caries of the teeth. It is known not only that teeth have deteriorated, but also that there has been a gradual narrowing of the jaw, which is becoming so marked as to cause justifiable alarm. The primary cause which has led to this, is lack of use. To produce strong teeth is almost as simple as to produce strong arms—use them. If children could be sent to a chewing school as they are sent to a kindergarten, there would be marked improvement in the race.

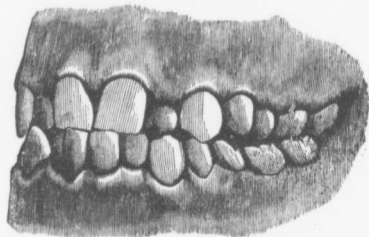
There is but little food for the child which affords any exercise for the teeth and the muscles of the jaw; and there is but little advice or encouragement given to induce children to masticate their food properly. The average meal for the average child is likely to be a bore, and he hurries through it, washing his food down with water in order to seek a more congenial occupation. It is necessary that children have at each meal some wholesome article of food that calls for vigorous mastication, and the parent should see that the child masticates it properly. If this plan is persisted in, the habit will soon become established and will never be forgotten. Bills for dentistry will be reduced, the child's teeth will become strong and well polished, and there will be distinct enlargement of the jaw and a strengthening of the facial muscles. There can be no exaggeration of the marvellous results achieved by vigorous mastication. It is because uncivilized races live upon food that is tough and but imperfectly cooked, and which requires a great deal of chewing, that they are invariably shown to have excellent teeth, free from irregularities and firmly planted in the jaws, to which are attached strong facial muscles.

It is not the purpose to advocate any particular diet, but merely to call attention to the fact that the presence of teeth in the mouth cries aloud for such a modification of the diet of the child as will produce in them functional activity. Even the temporary teeth must have a goodly amount of exercise since exercise insures a goodly amount of blood supply, and upon this depends not only their own preservation and usefulness, but also the size and shape of the jaw, and the texture of the permanent teeth which follow. While the jaw is undeveloped and the bones are soft, it is obvious that it is more susceptible to the various influences which affect it than after full development has taken place. And during this period exercise will do much to insure proper development. Even after eruption, permanent teeth are not fully formed. Exercise of the teeth then is necessary to assist in their proper development, which is not complete till several years after their appearance.

In addition to the careful mastication of food and a careful selection of food, the child should be taught to cleanse its mouth just as carefully as it does its hands and face. This habit, once instilled into the child, will always remain. Even at the early age of two years, a child can be taught to use a brush, and before that time the nurse should carefully wash its mouth with a boracic acid solution.

## IRREGULARITY OF TEETH AND DECAY.

Irregularities of the teeth have a marked effect on the frequency with which caries occurs in the mouth. All teeth are naturally so shaped that they touch the adjoining teeth at but one point. If the teeth are irregular and in contact over a considerable area of their surface, a large portion is beyond the reach of a tooth brush, food lodges there, disintegrates and forms an excellent location for the development of bacteria. The cause of these irregularities cannot be considered in detail here, but it is well to emphasize the fact that the premature loss of the temporary teeth is responsible for many irregularities of the permanent ones. This is not the only cause, as thumb-sucking, mouth-breathing, etc., also produce their irregularities, and it is necessary to check these bad habits; but it is more important to properly care for the temporary teeth of the child. Consider the consequences of neglect. The teeth decay, the pulp becomes involved and exposed, causing the child pain and discomfort. It is afraid



Irregularity of Teeth.

to masticate its food, and consequently bolts it, its stomach is overworked, then follows indigestion, intestinal trouble, ending very possibly in undermining the health of the child. In addition to this the jaws and teeth are not being used. As a result, the jaws do not develop, the gums become inflamed and spongy, the teeth more susceptible to decay, with consequent tooth-destruction and death of the pulp, abscesses are formed from which pus exudes into the mouth, and altogether there is a generally unhealthy condition of the mouth which can only act detrimentally to the child.

Realizing the immense benefit which simple food and hygienic methods will bring about, mindful of the truth that mastication will polish the teeth and stimulate healthy nutrition, appreciating the fact that inherited tendencies may be overcome, or their effects minimized by careful attention to the laws of health, still it is recognized that such developments take time, and the fruition of our ambitions cannot be reached in a day. In the meantime, teeth decay, yet how few are willing to give up fifteen minutes of each day to the care of their own or their children's teeth,

though it can be shown that such a course would result to a great extent in immunity from caries. As to the number of times a day which it is necessary to cleanse the teeth, no definite statement can be made; this will depend on the shape and regularity of the teeth, the conditions of the secretions, the food eaten, the amount of mastication performed, the care with which brushing is done, and on the frequency of the more thorough polishing by the dentist.

#### HOW TO BRUSH THE TEETH.

It is self-evident that rapidly decaying teeth require more attention than those which are apparently extremely resistant to caries, and in some cases the frequency with which the teeth are brushed must in a measure be governed by the occupation of the patient. The teeth, if brushed properly, can never be brushed too often, but much injury may be done by unskilled brushing. Using too hard a brush, and too coarse a powder will wear the teeth to an injurious degree. People usually brush their teeth back and forth over those surfaces which are naturally kept clean by the muscular action of the face and lips. They overlook altogether those portions of the teeth where the food lodges and is difficult of access. To reach these places the bristles of the brush should be placed on the gums above the teeth (for the upper teeth) and by turning the wrist the brush is brought down toward the grinding surfaces, the bristles passing into and cleansing the spaces between the teeth. For the lower teeth reverse this order, placing the brush on the gums below the teeth and rotate the handle upward. In this way the gum tissue is not injured but is kept clean and healthy, while with the ordinary method the tissue in these spaces is more or less injured. Laceration of the gums is caused by wooden tooth picks. Silk floss should be *very carefully* used. It is necessary to employ both of these articles at times for the sake of comfort, but only the coarse particles of food can be removed by them, and they play little or no part in the prevention of caries. It may be added that injury to the gum tissue between the teeth, if severe, will eventually lead to its absorption, thus endangering the life of the tooth and rendering it more susceptible to caries.

#### WHEN TO BRUSH THE TEETH.

Self-respect and a desire for a better feeling in the mouth induces nearly everyone to brush their teeth in the morning; another two minutes may easily be taken after the morning meal for a second brushing, and the business of the day may then be started with a clean mouth and wholesome breath. If it is at all possible, the teeth should be brushed again after lunch, and all should make it an imperative rule that no food should be taken after the teeth have been cleansed for the night. The custom of giving a child a biscuit to eat as it goes to sleep has been productive of great evil. Partial dentures should never be kept in the mouth at night,

as the adjoining teeth are sure to be attacked by caries. As to the use of mouth washes, tooth pastes and powders, everyone should be governed by the advice of their dentist. There are many mouth preparations on the market; some have virtues, but it is wise to be advised in their selection.

It is the duty of parents to watch the teeth of their children just as carefully as they do their general health. A child should be frequently taken to a dentist who will have the child's interest at heart; the temporary teeth can thus be watched and filled, and so retained as long as nature intended they should. Parents should remember that it is just as important for the health of the child that the temporary teeth be retained in a sound and useful condition until the time of their exfoliation, as it is that the adult's teeth should be attended to. It is difficult for parents to distinguish between the first permanent molars, which erupt about six years of age, and the temporary teeth. Many of these first permanent molars are lost because of this inability to distinguish, and the child suffers an irreparable loss, for these first molars are really the most important teeth in the mouth. They serve the important function of preserving the requisite space for the other teeth, their early loss meaning an imperfectly developed arch.

#### DIET.

The diet of the child should be carefully regulated and, as soon as the child is of sufficient age to masticate, it should be given meats as well as starchy foods. Proper meats should be chosen—such as good beefsteak—as there is nothing better to give exercise to the teeth and jaws than the mastication of these. This also gives a mixed diet, which is preferable to an entirely carbohydrate or starchy diet. Children should not be given soft bread or soft food of any kind in excess. Give them their starchy food in such a form that they must masticate it. Do not allow them to drink in order to assist mastication.

If the child visits a dentist frequently he soon loses any fear that he may have, and, if the parents follow out the dentist's instructions, the child will soon acquire very good dental habits, and good dental habits will mean better teeth and better facilities for mastication, and this in turn will give the child an opportunity to grow up into a more robust adult than if handicapped with decayed teeth and an unhealthy mouth.

#### CHOICE OF TOOTH BRUSH.

In choosing a brush for the teeth do not select too large a one, and do not use one from which the bristles come out or break off, for, if they do, and lodge between the teeth, they will cause irritation and injury. A moderately stiff brush is better than one that is too soft. Above all things, use the brush frequently and carefully. Regular polishing by the dentist is necessary to keep the teeth free from all deposits which in many mouths form very rapidly.

## FOOD & TOOTH DECAY

FOODS WHICH ARE  
CLEANSING & PREVENT DECAY.

FIBROUS FOODS GENERALLY.

### EXAMPLES:

Fish, Meat, Poultry, Lettuce, Cress, Radish,  
Celery, Uncooked Vegetables (Cooked Vegetables  
are as a rule cleansing but in less degree than the uncooked).  
Stale Bread with Crust, Twice Baked and  
Toasted Bread of all kinds, Savouries, Fresh  
Fruits, Fatty Foods of all kinds, Soups, &c.

COARSE AND FIBROUS FOOD  
IS A  
**NATURAL TOOTHBRUSH!**

ISSUED BY THE EDUCATIONAL COMMITTEE OF THE NATIONAL DENTAL SOCIETY  
BY COURTESY OF BOARD OF EDUCATION, PHOENIX, ARIZ. OF MEDICAL INSTITUTE

## FOOD & TOOTH DECAY

FOODS WHICH ARE  
NOT CLEANSING & PRODUCE DECAY.

STARCHY AND SUGARY FOODS  
WITHOUT FIBROUS ELEMENT.

### EXAMPLES:

Sweet Biscuits & Cake, Bread & Marmalade,  
Bread & Jam, New Bread without crust,  
Bread soaked in Milk, Milk Puddings,  
Porridge & Milk, Stewed Fruit, Honey &  
Sweets of all kinds, Cocoa & Chocolate.

WHEN THE ABOVE ARE EATEN

**CLEANSING FOODS  
SHOULD FOLLOW!**

ISSUED BY THE EDUCATIONAL COMMITTEE OF THE NATIONAL DENTAL SOCIETY  
BY COURTESY OF BOARD OF EDUCATION, PHOENIX, ARIZ. OF MEDICAL INSTITUTE





## EFFECT OF DECAYED TEETH

ON

### **PROGRESS IN SCHOOL!**

Decayed Teeth and an Unclean Mouth

RESULT IN

PAIN PUS

INATTENTION

BOLTED FOOD

MALNUTRITION

INDIGESTION

EYE-STRAIN



DISEASE

THESE PHYSICAL HANDICAPS CAUSE

**RETARDED**  
**MENTAL DEVELOPMENT**

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## THE "SIX-YEAR MOLARS."

CARD I

They Belong to the Second Set.

These four molars come at six years, one on each side of the upper and lower jaws, just back of the last tooth of the First Set.

They are usually mistaken for teeth of the First Set.

The baby's first tooth is eagerly looked for. IT IS MORE IMPORTANT TO LOOK FOR THE FIRST OF THE SECOND SET. THE "SIX-YEAR MOLARS."



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		Fungus Diseases Affecting Vegetables. {	J. W. Eastham. J. E. Howitt.
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		Peach Diseases .....	L. Caesar.
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204	June 1912	Decay of the Teeth.....	Ont. Dental Soc'y.