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Practical Information About the Teeth

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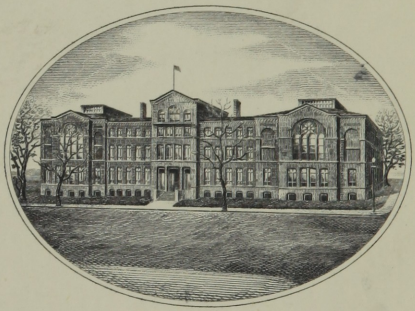

WASHINGTON, D.C.

PRACTICAL INFORMATION

ABOUT

THE TEETH.

A BOOK FOR THE PEOPLE.

BY ARTHUR HOLBROOK, D.D.S.

MILWAUKEE:
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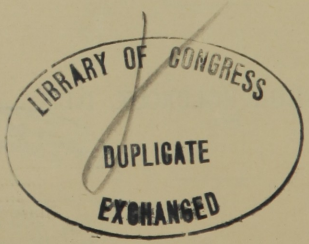
1879.



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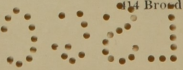


CONTENTS.

INTRODUCTION.

The healthful preservation of natural teeth is of the utmost importance to comfort and life. The premature loss of either temporary or permanent teeth is an irreparable injury. The exchange of natural for artificial teeth is an extremely hazardous undertaking. Artificial teeth ordinarily are very uncertain, and cannot be relied upon for comfort or usefulness. They are generally more or less unsatisfactory to their possessors, and they can never be made so perfect as to supply the place of natural ones. Art cannot successfully compete with nature in furnishing useful dental organs. It may possibly produce something which will *partially* remedy the loss, but it can never furnish anything which will fully supply the place, equal the beauty, or meet the requirements of healthy natural teeth.

Artificial teeth, however, are frequently a neces-

sity; and many persons have found great comfort in their use. When properly constructed, and perfectly adapted to meet the requirements of the individual, they may render valuable service; but when improperly made and poorly fitted, they not only fail to promote personal comfort, but are also a disfigurement, and are readily detected by the most careless observer.

Artificial teeth frequently fail to be of the slightest service; they are easily displaced, and extremely liable to accident. They often become unmanageable, or useless, at the most inopportune moment. Their loss or fracture unfits one for the enjoyment of business or social life, prevents the fulfilment of plans, causes serious inconvenience and disappointment, and occasions loss of time and money.

Probably the majority of persons who have worn artificial teeth have experienced only discomfort and disappointment from their use. The failure, however, is not always attributable to imperfect construction, or ill adaptation. The manufacturer is not always the only one to be blamed for unsatisfactory results. There are many cases in which the best artificial denture cannot be worn, owing to a peculiar, or highly sensitive condition of the mouth; and there are also cases where a practical

substitute cannot be satisfactorily fitted on account of natural impediments.

There are many reasons why artificial teeth can not always fulfill their purpose. The only safe rule to follow is to obtain the best. Of all substitutes for nature in use, there are none which require greater artistic and mechanical skill, and more patient labor and varied experience in their manufacture, than are demanded in the construction of a practical artificial denture.

Artificial teeth are usually attached to some kind of metallic or non-metallic plate, such as gold, platina, silver, rubber, celluloid, etc., which covers more or less of the gums and roof of the mouth, or if it is a partial set of only a few teeth, the plate rests around or against the natural teeth. In either case there is an unnatural arrangement, and one more or less injurious to the tissue or structure with which it comes in contact. At the present time most artificial teeth are attached to some non-metallic or non-conducting substance which does not permit the natural heat of the parts to pass off, thus increasing any inflammatory tendencies, and producing a softened condition of tissue which frequently unfits the mouth for wearing artificial teeth comfortably. Metal plates, therefore, are generally

the most agreeable to the palate, tongue and mouth, and are healthier, and superior to all others.

In view of their limited usefulness and the many particulars in which artificial teeth fail to replace natural organs, or to supply human necessities, it becomes an imperative duty for all persons carefully to guard and preserve their natural teeth in the most perfect and healthful condition possible.

The tendency of natural teeth at the present time is toward early decay. Their condition is indeed lamentable, and often discouraging. No other organs of the body seem to require so much personal and professional attention to secure their comfort and preservation. Their condition, however, is not so hopeless as many suppose. The teeth were undoubtedly designed to last a life-time, and under natural conditions they are generally preserved as long as they may be needed. There are good causes for their present unsatisfactory condition. Nearly all teeth can be saved by the intelligent application of simple measures. The exceptions are mostly of a hereditary nature. Many teeth which are considered past treatment, can be made serviceable, and more useful than the best artificial substitute.

There are many popular errors regarding the

permanency of natural teeth. Very little attention has been given to the causes of their destruction. Too much reliance is placed upon Nature to overcome unnatural surroundings. The dentist is almost exclusively depended upon to correct disturbances. Personal attention or individual assistance is not properly rendered. Comparatively few people understand the nature of their teeth or the causes of their destruction. Generally some one is employed to take care of their teeth, or they are left to take care of themselves. The result of this indifference or neglect, is a condition, which professional treatment can not always correct. Not until the people understand their teeth, and their surroundings and requirements, and apply intelligent personal care, can they hope to correct destructive tendencies, or improve their condition. Poor teeth are sometimes inherited, but ordinarily the responsibility for good or poor teeth rests mainly upon their possessors; therefore practical information about the teeth should be of interest to every one.

Owing to his imperative duties and limited time, the dentist is generally unable satisfactorily to answer important questions or to impart needed advice. Verbal information is easily forgotten, or unheeded.

Printed information, therefore, which may be read read or referred to at any time, is a very important and necessary aid to dentistry. The contents of this little Work have been gathered from various authorities, and from the results of many years of personal experience and observation on the part of of its author. It object is to present patients, parents, and others interested, with a simple treatise which which will familiarly impart desirable information, or assist in correcting some of the more common errors regarding the natural teeth.

Its length has not been considered, so much as has the importance of presenting practical information, and making each department as complete as the space would allow. It is intended for reading in parts, or at leisure, more than for consecutive reading, thus enabling the dentist to call the attention of his patient to any particular section in answer to questions, or for special information.

The arrangement of subjects will enable the reader to select the portion desired. Tables and other matters are placed in an appendix for easy reference. The author is indebted to many personal and professional friends, and especially to the members of the Wisconsin State Dental Society, for their encouragement and kindly assistance, in preparing

the work for a more general distribution than was originally intended. The labor of preparing the the work has been performed during the brief, irregular intervals snatched from business hours, and that the Work is crude and incomplete, and in many respects unsatisfactory, can not be more apparent to the reader, than to

THE AUTHOR.

Milwaukee, July, 1879.

PRIMARY CONSIDERATIONS AND ADVICE.

Primary Considerations.

IMPORTANCE OF NATURAL TEETH.

The teeth, at all times and among all people, have been objects of interest and study. They are very useful members of the body, and are intimately connected with every part of the physical human system. Their importance, for example, to the single function of digestion can only be measured by the value of health and even life itself Their influence upon the nervous, circulatory and respiratory systems cannot be estimated. Their healthful preservation promotes the happiness, and increases the strength of man. They contribute valuable service in the management and economy of life.

The teeth, like the eye, the ear the tongue, and other special organs, were designed for a life service, and their untimely loss is a very serious injury to the whole body. Their durability and appearance have very much to do with the business and enjoy-

ments of life. Their condition frequently determines the choice of a profession or vocation. Their health adds to the comfort of the body and the peacefulness of the mind. Their perfection adds to the beauty of of the face, and the tone of the voice. No other organ contributes more to the general welfare of the body.

Good teeth are desired by every one, but comparatively few people possess or enjoy a perfect set of natural teeth. Poor teeth are not desired by any one, but a large majority of people in civilized countries suffer more or less from troubles caused by an imperfect or unnatural condition of the teeth.

The teeth are the hardest portions of the body, and with intelligent care they should be serviceable and comfortable during an ordinary life-time, instead of being, as they are, the most unserviceable and uncomfortable, and the first portions to decay and die.

RESULTS OF ILL TREATMENT.

Diseases of the teeth, and of their surrounding structure, are among the most common afflictions of civilized people; they cause more pain and misery—more uncomfortable conditions of body and mind—than any other complaint; they are often

sources of permanent physical disturbances, sometimes causing a partial or total loss of sight, smell, taste or hearing; they frequently produce violent disturbances of the brain. Diseased teeth often permanently disfigure the face; they are disagreeable and often offensive—not only to the victim but to others. A similar condition, or the same degree of disease would not be tolerated, or even allowed to commence in any other part of the body, without the most untiring effort to eradicate the disease.

The teeth, generally, are the least understood, the most neglected, the most ill treated and the least considered of all the various organs of the body.

This universal indifference and disregard, by many persons who are otherwise the most fastidious and intelligent, cannot be satisfactorily accounted for.

In general, it is not until some form of disease or discomfort is manifest, that people begin to think about their teeth, or to take into consideration the necessity of proper treatment; whereas, tenderness, pain and unusual sensations, are only manifestations of encroaching or positive danger.

SOME OF THE GENERAL CAUSES OF PREDISPOSITION OF THE TEETH TO DECAY.

In caring for the teeth, the first obstacle to be overcome is their predisposition to disease, or unnatural tendency to destruction. To understand the causes which produce these unfavorable hereditary conditions will necessitate the most careful study and observation of the teeth, and a general understanding of the whole body and its dependencies. This little work will only aim to furnish help towards a more extended reading.

The teeth are an active or vital part of the bodily system and are intimately connected with the very centers of life. An improper or feeble diet affects the teeth as well as other parts of the body. If the material supplied to the body is deficient in quantity, quality or variety, the result will be wasting or weakness. If the body suffers from inherited tendencies or from constitutional weakness, the teeth will be more or less affected. If the teeth suffer from any cause, or are disabled, the body itself will be affected in consequence.

The body depends upon the teeth for one of the most important functions in the human economy—the proper mastication, or natural preparation of food—and in return, the teeth depend entirely upon

the faithful observance of natural laws for their own health and life. Defective organization, hereditary tendencies, and poor nourishment, are the primary sources of degeneration. The teeth are predisposed to decay or destruction, not from purely natural causes, but from constitutional derangements, or the violation of natural law.

The most civilized and perfect of God's creatures ought to have the most perfect dental organs. The Creator has provided everything to meet the wants of every part of the body, the bones and teeth not excepted. The teeth of wild animals, of uncivilized tribes, and of all people who live in accordance with Nature, are witnesses to this fact; and the teeth of domesticated animals of nearly all civilized nations—or of those beings who are living artificially—demonstrate their unnatural tendency to early loss.

Those nations who best observe the laws of Nature, enjoy the best physical development, the best teeth, and the highest mental power. Thus, in Scotland, where great attention is paid to proper diet, and where the bone-producing element in food is used most freely, and where abundant exercise, sunlight and recreation are all combined, there are fine teeth, healthy bodies, and high intellectual re-

sources. There are also sturdy frames and solid teeth among the laboring and middle classes of Germany and other countries, from a similar observance of natural requirements. Neither animals nor savages can long survive upon articles which are the chief food of modern or fashionable life. The unpleasant fact is forced upon all thinking people that the modern manner of living has interfered with the whole plan of Nature, and changed the whole course of life.

The primitive mode of life was more in accordance with natural requirements, but since the present cannot be easily exchanged for the past, it is well to combine the two as far as practicable. The teeth of our ancestors did not require the constant attention now demanded, and it is only within the last century or two that human teeth have made such serious decline toward annihilation, or premature destruction. Evidently many of the sources of destruction are within the control of individuals, and can be avoided by an intelligent understanding and faithful application of those truths which are the foundations of all dental science.

With the present mode of living, are connected dangerous tendencies, which if left unchecked from

generation to generation, will eventually result in permanent dental deformity.

NATURAL PROTECTION, EXERCISE, FOOD, &C.

The primitive or natural mode of living, is calculated to strengthen, invigorate and preserve every part of the bodily system. The Creator has not only provided the necessary materials for physical sustenance, but he has also fixed the proportions of the elements which form the materials. If the proper proportion of any element is wanting, this want may destroy the whole material for food purposes.

Teeth, at the present time, suffer largely from a lack of exercise. The manner of preparing much of the food in modern use not only destroys a portion of its natural element or robs it of some important part, but it deprives the teeth of necessary exercise. Exercise of the teeth is their natural external protection. Whoever has seen ancient skulls, or has looked into the mouths of modern people who live according to Nature, may have noticed the polished and perfect condition of the teeth. They fairly glisten, and are almost impenetrable. They are not only supplied with good material, but are able to perform the necessary service of crushing, grinding, and thoroughly mixing the food,

before offering it to the general system. Modern food, therefore, as prepared by modern processes, is a frequent source of degeneration of the teeth, not only by its failure to supply healthful structure and nourishment, but also by its failure to furnish necessary and natural exercise. Teeth of animals which have been deprived of their natural diet and exercise, soon decay and become diseased, as can be seen by examining the mouths of still-fed cattle, &c.

Then again, many substances taken into the mouth for food or for pleasure are in themselves destructive elements, and nearly every article can be readily converted into an active agent of destruction by simple union with other substances or by chemical changes or decomposition.

Under natural conditions the proper supply of food strengthens the teeth, and enables them successfully to resist ordinary influences, and at the same time to preserve their surfaces. Under the present weakened or deficient condition, it only requires a very slight attack from any disturbing element to affect the surfaces of the teeth and cause their entire destruction.

Deposits of food, or of any other substance upon the teeth, not only destroy the teeth, but if allowed to remain and accumulate, will also disturb or des-

troy the structure which surrounds and supports them. Absolute cleanliness is, therefore, of prime necessity in preserving the natural teeth.

CARE OF THE TEETH.

Early destruction or loss of the teeth is generally the result of neglect or ill-treatment. It is a matter of continual wonder to most people why the teeth decay; why Nature gave her subjects such destructible organs, and why so much personal attention is required to keep them in a healthy or comfortable condition. The responsibility is thrown upon Nature, when in fact Nature has preserved them under the most unfavorable and unnatural conditions for a much longer time than their owners had the right to expect.

Decay, however, is not the only process of destruction. There are other sources of danger which are generally unobserved and unsuspected. The usefulness of the teeth is frequently destroyed, while the teeth themselves are in an apparently perfect and healthy condition.

Loss of teeth may result from various causes. It would be impossible specifically to enumerate or to describe them all. Persistent personal effort, even under the most careful and intelligent direction, frequently fails to discover dangerous conditions, or

to save the teeth. There are so many obscure or hidden sources of danger that they are not readily detected by ordinary means, and are not discovered or externally revealed until trouble has already begun.

Decay and diseases affecting the teeth, when once commenced, continue until the teeth are destroyed, unless proper measures are adopted to change the condition or to correct the trouble.

In the present condition of teeth, and with the present habits of living, the efforts of the owner cannot be depended upon to discover dangers, or to apply appropriate remedies. Personal attention is of the utmost importance to the health and preservation of teeth, but it is unwise and unsafe to rely for their safety, wholly upon personal observation or judgment. To intrust the teeth to a reliable dentist for frequent examination, and for the necessary operations, is one of the first steps toward securing their safety or preservation, and this step should be taken early in life and regularly followed.

Nearly all painful, protracted and expensive dental operations might be avoided by early and proper attention to the teeth before disease or decay is usually revealed, or has had time to produce complications.

The opinion of the dental profession is united in advocating the importance of early and continued attention to the teeth. The habit of delaying dental operations until they become a positive necessity, or until the process of destruction has rendered their successful treatment almost impossible, must be corrected if the preservation of the teeth is desired. The dentist is usually applied to at the last moment, and is required to overcome the most unfavorable conditions. It is very seldom that he is requested to adopt preventive treatment. In fact the dentist is frequently charged with unnecessary operations. The teeth are poor enough, degenerating fast enough, and furnish employment enough to satisfy the most unconscionable operator. Improper treatment is frequently applied, but the public must discriminate between the conscientious and the unprincipled operator. Many dental operations are so poorly or imperfectly performed that they are an injury, but the value of good dental services, nevertheless, is beyond estimate.

PROVINCE OF DENTISTRY.

The science and art of dentistry pertains to the treatment of natural teeth, and the construction of artificial dentures. It is intended to benefit and meet the wants of mankind. The prominent fea-

ture of the art is one of replacement. It restores important organs to usefulness, or replaces destroyed portions with other material. It adds comfort and strength to the body, beauty to the face, and tone to the voice.

"And as beauty is not a mere plaything, but a great force, like gravity or electricity, the art which keeps it, mends it, and to some extent makes it, is of corresponding importance. But add to this the consideration that speech is so largely dependent upon the perfection of the teeth that our language, we might almost say, loses a letter with every tooth that falls. The province of dentistry is only second in importance to the other domain of medical science and art, the opthalmic. In some respects it is of greater public interest than the other. Most children's and young persons' teeth require positive attention ; whereas their eyes, in a great majority of cases, take tolerable care of themselves."

PROGRESS OF DENTISTRY.

Dentistry has existed from a remote period of time ; it is not a modern invention or art. Its origin is unknown. It was practiced as a distinct branch of surgery, and held a prominent place among the arts long before the Christian era.

Hippocrates, "the father of medicine," entered deeply into a study of the teeth 500 B. C.

Herodotus, one of the early historians, noticed and described various dental operations 450 B. C.

Aristotle, the philosopher, wrote largely concerning the teeth, 350 B. C.

Celsus, a Roman author and physician, wrote extensively about the teeth, their diseases and treatment, about the beginning of the Christian era; and Galen, also, about A. D. 150.

The sayings and counsels of these, and many other ancient authorities, are still quoted and will forever hold good. Many dental operations are also alluded to by Greek and Latin poets.

The progress of dentistry in that remote period was continually retarded by superstitious influences and various other hindrances; but that the art existed and made considerable advance, is attested by evidences of its proficiency yet in existence. Various specimens of dental art, from unknown ages, are preserved.

The tombs and mummies of Egypt, the sarcophagi of Greece, the temples of India, the ruins of Pompeii, and many other burial places of the ancient dead, have contributed interesting specimens of primitive dentistry.

Artificial teeth carved from wood or ivory; natural teeth filled with gold or gilded wood; natural and artificial teeth held in place by peculiar appliances and arrangements, and various other specimens of ancient dental work have been discovered and preserved.

Notwithstanding the extreme age, and the great possibilities of dentistry, it did not make any material progress, or occupy any prominent place in the world, until recently. Specimens of dental art, however, exist which although two or three thousand years old, will compare favorably with specimens made at the beginning of the present century, and in fact with many specimens made at the present time.

At the exhibition of 1876 in Philadelphia, there were exhibited an upper and a lower set of artificial teeth which are of historical and national interest. They were manufactured by a Dr. Greenwood of New York, about 1790, for the foremost man of that time—GEORGE WASHINGTON. They were carved from solid blocks of ivory, and undoubtedly they were the very best which could be produced at that time. They may be taken as representing the best dental art then existing, and yet their general character, and manner of construction, were similar

to those made when "ignorance, superstition, and bungling awkwardness reigned over the whole province of art." Tradition inform us that these artificial teeth, or rather "false teeth," were a continual source of annoyance and mortification to their illustrious possessor. The contrast between those ivory excuses and the beautiful substitutes displayed beside them was especially gratifying to Americans.

Dentistry was lost to history for many centuries. Very little is known concerning it, from the time of Galen in the second century to the time of Ambroise Pare in the sixteenth. It would amuse the reader to look back and see the forms of dentistry, and learn the superstitious beliefs and notions of two or three centuries ago. Even now many of the absurd fancies of that time are believed among some of the inhabitants of all countries.

More or less attention has been given to the teeth by many eminent investigators during the past three hundred years, but their conclusions or theories have nearly all failed to stand the test of recent discoveries. A few truths have been brought to light, which will render the names of their discoverers famous and enduring.

DENTISTRY AS A PROFESSION.

Dentistry benefits according to the necessity for it, and to the proper adaptation and perfection of its services to individual requirements.

Not until the present century has dentistry taken rank as a profession. Not until recently has the anatomy of the teeth been fairly understood. About 1820 it commenced its more permanent and rapid advance. Not only the basis of dental art, but the methods of practice, have undergone wonderful transformation. What was once considered truth is now known to be error, and the mistaken theories of the past have necessarily been abandoned. Experience and human ingenuity are advancing to meet the development of dental truths. Old practices are inconsistent with the present understanding of the teeth. New discoveries and different applications are being continually made. The discovery of superior methods and more perfect appliances is doing away with many of the primitive agencies.

Like all progressive sciences or arts, dentistry is retarded in its usefulness by want of a proper responsiveness in all its followers, and a lack of trust or appreciation in its beneficiaries. Time, however, will settle all these conditions, and it will not be

many years before the people will demand an intelligent, conscientious, and faithful application of every truth known to dental science. Already there are many States in the Union, and many foreign governments, which have adopted stringent dental laws to protect their citizens from the evils of ignorance and empiricism. Legal restriction, however, belongs to the people, not to the profession. The legislatures of New York, New Jersey, Pennsylvania, Ohio, Alabama, Georgia, and others have passed laws making it a misdemeanor for any one to enter upon the practice of dentistry without a diploma from some legally constituted college or institute of dentistry, or without first passing a satisfactory examination before a board of censors.

AMERICAN DENTISTRY.

The people of the United States in particular, have good reason for being encouraged. In 1820 there were only about one hundred dentists in the country. Now, in July, 1879, it is estimated there are over twelve thousand persons engaged in the practice. In 1839, the first dental college, and the first dental periodical of the world were established in Baltimore; now there are a dozen colleges, and many periodicals scattered throughout the land. Dental societies for promoting the usefulness of

dentistry; for advancing the standard of dental excellence, and for the interchange of ideas and methods are established in nearly every State and important city of the Union.

American dentists are scattered throughout the world, and wherever they appear in foreign lands, their services are sought by all classes of people from emperor to serf, in preference to their own native practitioners. In no other country has dentistry attained such perfection and usefulness as in America; but with these has also come much that is calculated to injure and retard it progress. Dentistry is a liberal art, and generous to the world. It is anxious to reach a perfect service. It is not bound by dogmas or individuals. It desires the moral encouragement of every individual in its endeavor to acquire a true and honorable basis.

TRUE MISSION OF DENTISTRY.

Its mission, however, is mistaken by many. Bad dental practice instead of encouraging the preservation of these useful organs, hastens their destruction and loss.

It is estimated that in the United States alone, over five million artificial teeth are manufactured and sold annually, to supply the losses of natural teeth destroyed by disease. In many of the larger

cities there are establishments devoted exclusively to the painless extraction of teeth, and other establishments to their replacement. This wholesale manner of treating teeth is calculated to destroy the future health and happiness of the race. It is true that many persons have made repeated efforts to save their teeth, and have resorted to artificial appliances only after all personal and professional effort had failed. Such a mistake is generally made early in life.

It is reasonable to assert that a majority of all troubles with the teeth can be avoided by simple treatment, or the intelligent application of simple truths, if commenced in season; but when hereditary and acquired tendencies are permitted to work unmolested until the teeth are painful, or until the disease has embraced the vital structure, then the result cannot be as permanent or as satisfactory. The proper way is to consult a dentist as soon as the teeth have erupted, and to follow his advice unhesitatingly, and not to wait for the appearance of any trouble, which in nearly every case will come sooner or later.

PRACTITIONERS OF DENTISTRY.

The dentist is often placed at great disadvantage by the fact that his own convictions and inclinations

are disregarded or overruled, and made subservient to the views of those who are not practically or theoretically qualified to judge of the conditions or requirements of the case.

A dentist should be chosen for his faithfulness to his patients, his proficiency in his profession, his integrity in business, and his moral rectitude; and when so chosen, he should be entrusted with the whole management of the case. An honorable dentist will only perform necessary operations, and only demand a fair compensation. The dentist comes next in importance to the family physician. The responsibilities of each are, in a measure, alike. Like the physician, the dentist is dependent in a very large degree upon the personal assistance of his patient, for the success of his remedies. He cannot guarantee their effect with any more certainty than can the physician. He may understand the nature of the disease and the character of his remedies, but he cannot foretell results with unerring certainty. The dentist, like the physician, is mainly dependent upon his good name for success in securing a reliable patronage. His character is his heaviest investment, and whatever impairs or disturbs his reputation robs him of so much capital. Many faithful and deserving practitioners have been

supplanted by more assuming, but less qualified persons, through the influence of large promises or cheaper work. People are not always careful in making their selection of a dentist; they frequently go shopping for the lowest bidder; they do not consider that professional excellence can vary as well as silks and laces, or that what is cheap, may be dear at any price. Let no one, therefore, be deceived by flattering promises, or alluring advertisements, but rather first inform himself of the nature and requirements of the teeth, and then select an advisor or operator, in accordance with the information he has obtained.

DENTISTRY UNLIKE OTHER PROFESSIONS.

Some facts connected with dentistry should be thoroughly and dispassionately presented to the people. Dentistry, in many respects, is unlike any other calling. Its followers are generally isolated from each other, and seldom meet during office labors. This separation causes more or less individuality and self reliance. It causes distrust or disregard for the opinions or practices of others. For this reason dental societies should be encouraged, and facilities increased for a more general diffusion of dental knowledge.

Again, most people who seek the services of a

dentist go with dread or hesitation—very few for pleasure, or with the expectation of passing a comfortable hour. The dentist is obliged to meet one and all alike, and be ever ready to extend his services promptly and without limit. To meet all the varied conditions of temperament, and please all, would be an utter impossibility. The dentist is charged with all sorts and kinds of feelings; to one he seems harsh and unfeeling; to another he shows too much sympathy; to another he is careless; to another too careful, &c., &c., through the whole category of complaints.

There is undoubtedly a happy medium of conduct which will please a majority of people, and which the dentist is anxious to follow, but many are exacting in their claims, and do not stop to consider the continual demand upon the dentist, or allow any considerations to interfere with their plans. The dentist, wearied and perplexed by some intricate and delicate operation, is frequently obliged to cease his labor at a time when every moment is of the utmost importance to success, and to turn aside to meet another sufferer who also demands immediate and careful attention, and who will grow nervous and uneasy if obliged to wait, thus placing the dentist between two parties where

inattention to either may provoke feelings of displeasure, or possibly a loss of patronage. It requires a firm and gentle hand and a brave heart to deal continually with people who are suffering. The dentist is human, has a heart, and can understand the dread of pain. Therefore let all persons who seek his services be just in estimating his worth, or in deciding upon his character. It is the duty of the dentist to accomplish his task efficiently and satisfactorily, with the least amount of pain possible, and with a proper and elevated regard for his suffering patient.

To save a mortal from the grave,
A limb from amputation,
Preserve the visage from a cave
With healthy mastication—
Are blessings that the race desire,
In filling life's true mission,
And *he* is worthy of his hire,
WHO ACTS THE TRUE PHYSICIAN.

THE TEETH,

SPECIFICALLY CONSIDERED.

Explanation of Figure I.

Nerves.

Opthalmic Division: 1. Frontal. 2. Nasal and long Ciliary. 3. Branches to Ciliary Ganglion.

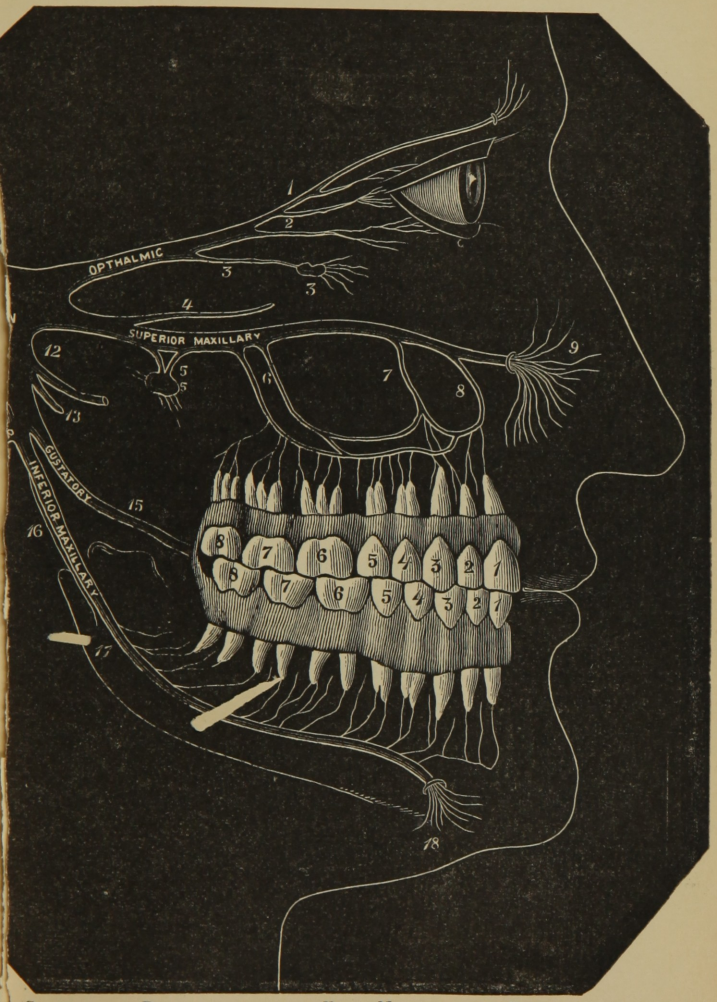
Superior Maxillary Division: 5. Meckels' Ganglion. 6. Posterior dental (back teeth.) 7-8. Anterior dental (front teeth.) 9. Infra Orbital, (lower eye-lid, nose, upper lip, &c.)

Inferior Maxillary Division: 10. Auriculo Temporal (hearing.) 15. Gustatory (taste.) 18. Mental.

Teeth.

1. Central Incisors.
2. Lateral Incisors.
3. Cuspids.
4. First Bi-Cuspids.
5. Second Bi-Cuspids.
6. First Molars.
7. Second Molars.
8. Third Molars.

Note.—"The nervous system consists of a series of connected central organs, called collectively, the *cerebro spinal centre* or *axis* of the *Ganglia*, and of the *nerves*." * * "Ganglia may be regarded as separate and independent nervous centres, of smaller size and less conmplex structure than the brain, connected with each other." * * * "They consist of a reddish-gray substance, traversed by numerous white nerve fibres;" they are invested by a smooth and firm, closely adhering, membranous envelope. "The *Casserian* Ganglion is lodged in the petrous portion of the temporal bone. From its anterior border three large branches proceed, the Opthalmic, Superior Maxillary and Inferior Maxillary. "Nerves are round or flattened cords communicating, on the one hand with the cerebro-spinal centre, or the Ganglia, and, by the other distributed to the various textures of the body, forming the medium of communication between the two." "The *Cranial nerves* are nine in number, on each side. They have been named numerically according to the order in which they pass out of the cranial cavity." The *fifth nerve* is the largest cranial nerve. It is the greatest sensitive nerve of the head and face and teeth; the motor nerve of the muscles of mastication, and its lingual branch is one of the nerves of the special sense of taste."—Gray.


OPTHALMIC
SUPERIOR MAXILLARY
GUSTATORY
INFERIOR MAXILLARY
1
2
3
3
4
5
5
6
7
8
9
12
13
15
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17
18
8 7 6 5 4 3 2 1
8 7 6 5 4 3 2 1

THE TEETH.

TWO SETS.

All persons on arriving at maturity have been provided by nature with two sets of teeth, which appear at different periods of life. One set is designed for service during childhood, and is called deciduous or milk teeth. The other set is designed for a life service, and is permanent. The temporary teeth are fewer in number and smaller, but resemble in form those of the permanent set. There are various peculiarities, however, which distinguish the teeth of one set from those of the other. To the ordinary observer, very little, if any difference is detected, and the consequence is more or less confusion regarding them. From the age of five or six years to the age of twelve or fourteen, teeth of both sets are standing side by side in the mouth, and the confusion frequently leads to serious results.

As a general rule the first four teeth of the second or permanent set are in their places behind the first set, before any of the temporary teeth are naturally shed. (See figure 4.)

All first teeth, therefore, are not "shedders," but all temporary teeth are.

TEMPORARY TEETH.

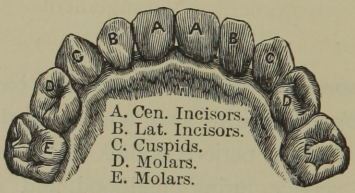


FIGURE 2.

A Full Upper Set of Temporary Teeth.

The temporary teeth are twenty in number, ten in the upper and ten in the lower jaw. (See figure 2.) They usually appear through the gum in the front part of the mouth, when the child is about six months old and generally in the lower jaw first. The time and order of their appearance vary. Tables are only of limited assistance, but in the appendix can be found the average time and order of the eruption of all the teeth. (See Appendix A.) The temporary set is usually completed during the third year.

TEETHING.

Teething is an important event in every family, and is anticipated with extreme solicitude. It is sometimes a very serious process, and accompanied by more or less disturbance of the whole physical system. The eruption of the teeth, however, is a necessary and natural process, and ought not to be attended with any serious derangements. A strong healthy child ordinarily requires very little treatment during dentition, but when treatment is required it should be prompt and thorough. A weak, delicate and susceptible body is not prepared to resist irritating influences and the result of their long continuance is an overworked system, or exhausted condition, thus "opening the portals, as it were, to enemies that otherwise might have passed harmlessly by." The manifestations of discomfort generally disappear after the first teeth appear. As a rule, a delicate infant suffers more than a robust one, and later dentitions are easier and safer than earlier ones.

Strict attention to diet, bathing, pure air, exercise, sunlight and sleep, are generally the only medicines required. When irritation continues excessively, or distressing symptoms appear, the family medical adviser should be consulted without delay.

IMPORTANCE OF PRESERVING TEMPORARY TEETH.

The temporary teeth are a very important part of the physical system, and have very much to do in forming a healthy, vigorous constitution. Upon these teeth in an extraordinary degree depends the perfection of the whole physical organization. Their services are required at a time when the foundations of life are being formed, when the most perfect physical and mental conditions are essential to a full development, and when the loss of any part of the body will be detrimental to the whole system. At no other time in life are sound, serviceable teeth more necessary than during the years of growth and ripening. The temporary teeth also have very much to do with the beauty and symmetry of the face, and in a large degree they control the regularity, beauty and perfection of the permanent teeth.

It is therefore a serious mistake when temporary teeth are permitted to decay, or to be prematurely extracted. Their preservation is a prime necessity to health and future happiness. If decay commences, it should be instantly remedied, and not allowed to continue until pain or discomfort results. When nature desires the removal of temporary teeth, she employs a process which is peculiar

to this set, and it is generally unnecessary to employ other means. There are exceptions to this rule, but under ordinary natural conditions, all the temporary teeth are lost without professional aid.

"Shedding" usually commences about the sixth year, and continues at irregular intervals until the twelfth. If from some cause nature fails to remove temporary teeth, or if their artificial removal becomes a positive necessity, then at the proper time they should be removed by the dentist.

Filling temporary teeth when decay has commenced is an important service, and should be promptly attended to. Ordinarily, when taken in time, and before decay has rendered them sensitive or painful, the temporary teeth can be saved with very little trouble or expense. The character of these teeth only demands a temporary treatment. As soon as the child is old enough to apply personal care, the use of the brush and other cleansing appliances should be commenced. The special requirements for individual cases, must be learned from the family dentist.

Under no consideration should powders, washes, soaps, and freely advertised nostrums be resorted to without the consent of the person who has the professional charge of the teeth, otherwise serious re-

sults may follow, which the dentist may not be able to correct.

PERMANENT TEETH.

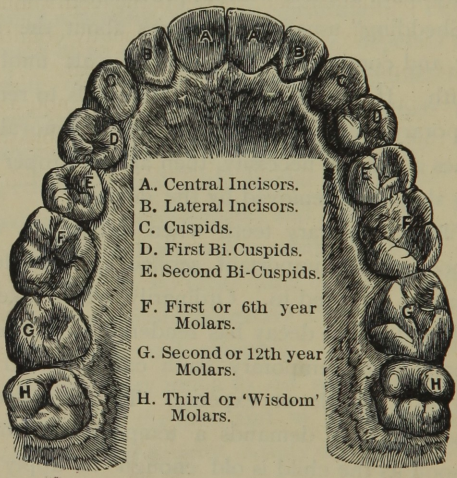


FIGURE 3.
A Full Upper Set of Permanent Teeth.

The permanent teeth are thirty-two in number, sixteen in each jaw. (See figure 3.) The first teeth of this set usually uppear during the sixth year, and the set is complete at the age of fourteen, with the exception of the "wisdom teeth." The average time and order of the eruption of the permanent

teeth can be found in the appendix. (See appendix B.) As a rule however, all teeth which come after the third year, may be considered as belonging to the permanent set; therefore the teeth should be most carefully watched, and frequently counted after the commencement of the fourth year.

The eruption of permanent teeth does not, as a general rule, produce any unusual or noticeable disturbance, and their presence is frequently unsuspected. The first teeth of this set usually come before any of the temporary teeth are shed; they occupy places immediately back of the temporary teeth, and thus increase the number to twenty-four, or to twelve in each jaw.

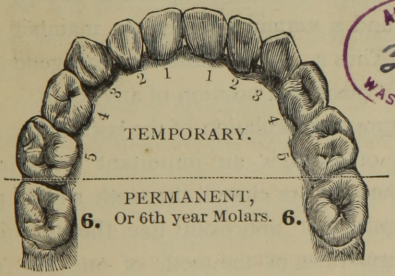


FIGURE 4.

Usual Arrangement of the Teeth at the Sixth Year.

Counting from the center line of the mouth back-

ward, the sixth tooth will be the first tooth of the permanent set, which usually comes about the sixth year, and is called the sixth year molar. (See figure 4.) None of the permanent teeth are "shedders."

NATURAL POSITION OR REGULARITY.

Teeth are implanted in firm, bony structure called the "Alveolar process," which in health is covered by the gums. The crown of each tooth is fully formed before it makes its appearance outside the gums, and does not grow into position as many suppose, but is forced into position after attaining its growth, the elongation of the roots assisting in the process.

Each tooth has a certain place to occupy in the mouth, and a certain position to maintain in its place. Thus a careful observer can generally tell the exact place and position of any tooth.

The proper articulation of the jaws, or the natural position of teeth, is an important consideration. When the jaws are closed, the teeth should present an irregular but unbroken line, the prominences and irregularities of the teeth of one jaw exactly fitting into the depressions and irregularities of the other; the upper front teeth, designed for cutting and dividing food, should lap over, or hide about

one half the visible part of the lower; those back of the eye teeth, designed for crushing and grinding food, should close so that they are end to end, but so arranged that the force of one tooth is met by two antagonizers. (See figure 1.)

The natural position of teeth, is the one most favorable to their health and preservation.

REGULATING.

The beauty and health of teeth largely depend upon their regularity. An irregular or crowded condition destroys their appearance, and frequently disposes good teeth to destruction. Irregular teeth when taken in season, may usually be corrected by simple and comparatively painless operations; therefore, while the permanent teeth are coming, they should be under constant care and judicious management.

After the teeth have become settled in position, and when they present an uninviting appearance to the dentist, he often hesitates to undertake the responsibility of changing their position or the task of correcting their irregularities, on account of natural impediments, or a lack of hearty co-operation by those who ought to be the most interested. When delayed beyond a certain time, the correction of irregular teeth is generally one of the most tedious

and unremunerative operations connected with dentistry. Between the ages of twelve and fifteen is usually the most favorable time for correcting irregularities. It is sometimes necessary to abandon the case, even after having made a beginning, on account of the lack of patience and appreciation on the part of the patient. All points should be carefully considered by the patient before deciding upon the operation, and when once begun it should be carried through without interruption.

The first local care is required in the arrangement of the teeth, and as the natural position is the one most favorable to their natural preservation, so it is also the most favorable to their successful treatment. The eruption of the teeth, and their proper arrangement, then, are an important study, and demand constant attention. Too little attention is generally given to this branch of dentistry by the profession, for reasons before stated, and scarcely any attention is given to it by the people, because its great importance is not distinctly understood.

CLASSES.

The teeth present many marked differences in their external appearance. They have many varieties of shape, size and color. They are divided

into classes, the different classes indicating differences in temperament, organization, &c.

The quality of the structure of the teeth depends upon the materials supplied, the bodily condition, and inherited tendencies. The best teeth are not always the "prettiest," or those most admired. Perfect teeth, or those adapted to severe service, have been described as having a medium length and width, a dull white color, faintly tinged with yellow near the gums, which gradually blends with the white and which becomes more apparent as age advances, a perfectly regular surface with no deep pits or depressions, and symmetrical in form. Teeth of this class are to be found everywhere, but not to the extent desired. There are other descriptions which will apply to good, serviceable teeth, but ordinarily any deviations from the above indicate a departure from perfect teeth.

Under present modes of living, all classes and conditions of teeth are more or less subject to unnatural destruction. The most perfect teeth are not safe from danger, and individuals must not rely upon an apparently sound condition or appearance, or depend upon individual observation or care The intelligent dentist can usually read the condition of teeth and foretell their future from outward

appearances. The tendencies to destruction must be met by treatment adapted to their requirements.

GENERAL CHARACTER.

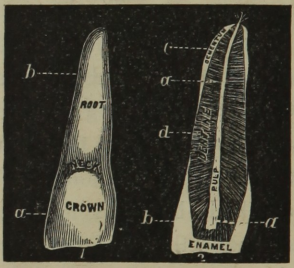


FIGURE 5.

A Central Incisor, Natural Size.

1. Exterior View.
2. Split lengthwise to show structure.

Each tooth consists of three portions, called the crown, the root and the neck. (See Figure 5, No. 1.)

The crown is that portion which projects outside the gum, and which is seen when it occupies its natural position in the mouth.

The root is the portion extending into the jaw, and which is concealed by the gum and bone.

The neck is the constricted portion, at the free edge of the gum between the crown and root.

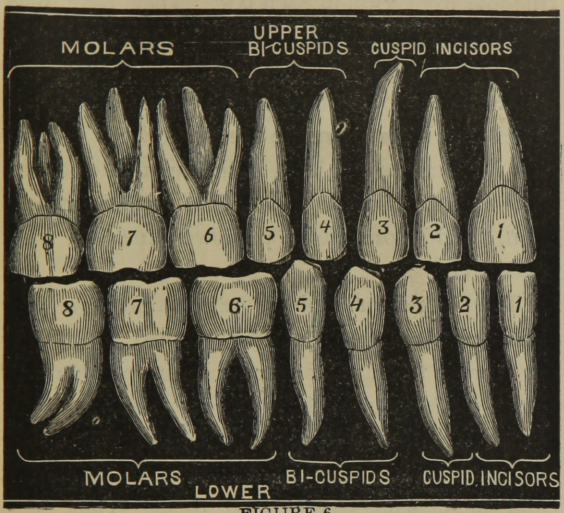


FIGURE 6.

Permanent Teeth of Right Side.

Showing number and arrangement of roots, general form and articulation of teeth, &c.

Teeth are divided into groups, called Incisors, Cuspids, Bi-Cuspids and Molars, each group being distributed upon both sides of both upper and lower jaws alike. (See Figure 6.)

The incisors, or cutting teeth, are so named from their presenting a sharp cutting edge, adapted for cutting food. They are eight in number, and form

the four front teeth in each jaw. They have only one root. The incisors of the upper jaw are larger and stronger, but are more readily acted upon by destructive agencies than those of the lower jaw. The lower incisors are the the smallest, but ordinarily they are the last teeth in the mouth to decay. The upper incisors, in a perfect or natural articulation, should close outside the lower, and not meet end to end.

The Cuspids or Canines, are so named from their having but one Cusp or point, adapted for seizing or tearing food. They are four in number, one being placed back of the incisors in each jaw. They are larger and stronger than the incisors, and owing to their prominence, a full expression of the mouth and face depends largely upon them. They have only one large, long root. The upper Cuspids are larger than the lower, and close over them. The upper Cuspids are commonly called "eye teeth," and lower Cuspids "stomach teeth," but literally they are no more directly connected with the eyes or stomach than are any of the other teeth; in fact not so closely as some of the others. (See Figure 1.)

The Bi-Cuspids are so named from their having two prominent cusps or points upon their ends.

They are eight in number, two being placed behind each Cuspid. They are smaller than the Cuspids, and generally have but one root, which, however, is frequently doubly formed. Sometimes there are two distinct roots. Bi-Cuspids, owing to their compressed condition, are generally more inclined to decay than any other class of teeth. Bi-Cuspids should close end to end, but between two opposing teeth.

The Molars, are so named from their adaptation to the process of grinding and preparing food. They are twelve in number, six in each jaw, three being placed behind each posterior Bi-Cuspid. They are the largest teeth, and their large, uneven masticating surface peculiarly adapts them to the purposes intended. The last or third Molar is commonly called the "wisdom tooth," from its late appearance. With the exception of the wisdom teeth, the upper Molars usually have three roots, two external toward the cheek and one internal toward the palate, and the lower Molars two roots, one front and one back. The wisdom teeth have from one to four roots, variously arranged. The first Molar, owing to its appearance at an early age, (usually coming before the sixth year,) is the most liable of all teeth to decay, and early loss. Bi-

Cuspids and Molars, should articulate end to end, but in such a manner that the end of one tooth strikes the end of and between two opposing teeth.

STRUCTURE.

Teeth in some respects bear resemblance to bone, but in their structure they differ from it in many particulars.

Teeth have a living or animal part, and an earthy or mineral part, each in a degree independent of the other, but each being necessary to the healthful preservation of the other. (See appendix C.)

Teeth differ from bones in their exposure to external influences, and their inability to unite after fracture, or repair themselves when injured or diseased.

On making a vertical section of a tooth, a hollow cavity will be found in the central portion. The shape of the cavity corresponds somewhat with the shape of the tooth it occupies; it forms what is called the pulp cavity, and contains the principal part of the animal or living portion of the tooth.

Counting the animal and mineral portions, a tooth may be divided into four distinct structures:

1. The Pulp; 2. The Dentine; 3. The Cementum; 4. The Enamel. (See Figure 7, No. 2.)

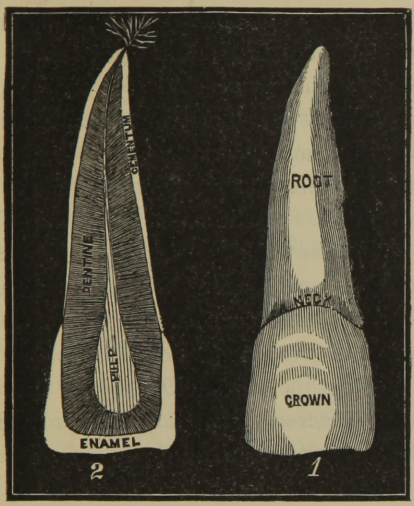


FIGURE 7.

A Central Incisor enlarged to show Structure.

1. Exterior View.
2. Split lengthwise to show structore.

1. The Pulp, commonly called the nerve, is the animal or living portion of a tooth. It occupies the pulp cavity, and to a certain extent it may be said to permeate the dentine. It is a highly organized and extremely sensitive substance, richly supplied with blood vessels and nerves, and directly connected with the great centres of life. It is not

simply a nerve as many suppose, but is a perfectly developed organization, and is the principal source of the life and health of the teeth. It is a part of the active living body, directly connected with the centres of life, and when diseased its importance is more painfully manifested than almost any other part. It enters the tooth at or near the end of the roots, and notwithstanding its elaborate perfection, the entrance into the tooth is so small, that frequently it can hardly be found by the unaided eye.

The life of the pulp is necessary to a healthful preservation of the teeth. Destroying the pulp, or "killing the nerve," is a dangerous remedy, and should be resorted to only in cases of necessity. The worst forms of toothache come after the nerve has been destroyed. As long as the pulp can be healthfully preserved abscesses or " gum boils" will not occur. Teeth, to remain healthful, active organs, require perfect and continual nourishment. The pulp is the organ upon which the teeth depend for life. Without a pulp or nerve the tooth is more liable to become diseased or destroyed. A tooth without a pulp, however, is better than a tooth with a diseased pulp, or with a healthy pulp largely exposed by decay.

A membrane covers the roots of the teeth, and to

a limited extent it assists in nourishing that part of of the tooth. After a pulp is destroyed, this membrane is overtaxed, and the result is an increase of circulation which may cause inflammation and serious complication.

The portion of the pulp found in the roots, is frequently so fine or delicate that complete removal is impossible, and if uncared for and left to decay it may cause serious trouble.

The proper course to follow in caring for the teeth, is to prevent the nerve from becoming exposed, or in any manner affected. The nerve may be destroyed by accident, or designedly, but in all cases where it is destroyed it should be removed, without delay, and as completely as possible.

The mineral portion of the tooth is the natural and only reliable protection of the pulp.

2. The Dentine is a bone-like substance which forms the body or principal part of a tooth. When a tooth is perfectly constructed, the dentine is not exposed to external agencies. It is the most readily destroyed of any of the mineral portions of the tooth, and therefore ought to be thoroughly protected.

It is traversed by innumerable and extremely delicate tubes or canals running from the pulp to the

under surface of the enamel and cementum. These canals are too small to be seen without the use of a microscope, but they contain certain nervous or life-giving fluids, which are painfully present to the touch. The pain which ordinarily follows exposure of dentine, or the opening of these tubuli, is often mistaken for an exposed pulp or nerve. As these canals lead directly to the pulp, it can be seen how important it is that the dentine should be completely protected by the natural structure, or by some protecting agency. By referring to Fig. 7 the reader will discover that decay must make considerable progress before it can reach the pulp.

3 The Cementum, or Crusta Petrosa, is a cement-like substance. It is not so dense as the dentine, and in its general character, it approaches true bone—nearer than the two other mineral structures of the teeth—the enamel and dentine. This fact is interesting when we remember that the cementum is the part in contact with the delicate tissues lining the root sockets. If the cementum was as hard and lifeless as the enamel, it would act as a continual irritant upon the living tissue surrounding the structure, but it contains considerable animal matter which is apparent to the individual,

after the gums have receded, or the roots are exposed to external agencies.

The cementum commences at the necks of the teeth and covers the roots.

4. The Enamel is the hardest and most compact part of a tooth. It commences at the neck, and forms a thin crust over the exposed part of the crown. It is the only part of a tooth which is naturally exposed to external agencies, the air, fluids, solids, &c. It is thickest at those points which are most exposed, or most used, and which require most protection, and thinnest at the neck or unused parts. It is nearly all mineral, and is generally the least liable to decay of any part of the tooth. Hereditary or constitutional defects of enamel open the way for destroying influences to affect the dentine.

Occasionally all there is left of the crown of a tooth is the enamel, and the first external signs of decay are often a "tumbling in" of the whole external structure, destructive agencies having entered through minute, hidden, or unobservable openings in the enamel.

It will be observed from the foregoing description that the structure of teeth is calculated to meet every requirement necessary for their preservation.

The living portions, which are sources of health, are naturally protected by hard, dense materials. The portions designed for contact with external objects are the hardest and most lifeless. The portion, in contact with living tissues have a peculiar construction which render the teeth comfortable and bearable, and often sustain the health, when the softer portions are destroyed. The hand of man cannot improve upon the general plan and construction of teeth. An All-wise Creator has provided everything necessary for their perfect formation and preservation. Man alone is at fault, and only by careful study and attention, can he regain what has been lost by carelessness and negligence.

FORMATION OF THE TEETH.

The perfection of the teeth will depend in a very large degree upon a proper or healthful growth, and as many errors prevail concerning the time and manner of their formation, a few words will possibly be of interest.

The origin and development of the teeth is one of the most curious and interesting processes of the animal economy, and the more one investigates the matter, the more impressed will he be, with the importance of paying more attention to the sources of their structure. Late investigations by

eminent men, have corrected some of the older theories, and now we can accept facts and apply them for our individual benefit. Mothers especially, should be well informed concerning the growth of the teeth, and understand that the process is contemporaneous with the growth of the child. Any physical disturbance, or lack of proper nutrition during the time of growth, will certainly endanger the healthful formation of the teeth. This fact should be strongly impressed upon those who desire their children to possess good and serviceable teeth.

Formation commences at a very early period, and as early as the sixth week of embryonic life, the germs from which the teeth will grow, can be readily seen arranging themselves upon the jaws.

The formation of both temporary and permanent teeth, occurs almost simultaneously. The teeth, however, are not all formed at the same time; usually the lower jaw is slightly in advance of the upper. The crowns of nearly all teeth, both temporary and permanent, have usually attained their full size and form before birth, and occupy places in the hard structure of the jaws. Dentition or "cutting" is not therefore entirely the result of growth, but is more properly a forcing out process.

The roots of the teeth grow and harden after the

crowns are formed, and are not perfect, until the teeth are settled in their permanent places. Thus, from the earliest period of life, until the teeth are settled in their respective places, the process of formation is at work, in some part of the tooth. It may be stated for general or practical benefit, that the crowns are formed before birth, and the roots afterwards.

In describing the structure of the teeth in a previous paragraph, it was stated that the dentine constituted the principal portion of the tooth, and that the part exposed in the mouth, was covered with enamel, and that in the central portion of every tooth was a cavity, which contained the pulp. In following a description of the formation of teeth it will be necessary to remember their structure, especially the crown.

The germs from which the teeth will grow, are called papilla, and from a mere spec upon the jaw, they will increase, until they attain the size of the dentinal part of the crown of the tooth. During the process of growth the enamel organ will be developed, and will arrange itself upon the dentinal papilla. After these structures have attained a proper size within the structure of the jaw they are enclosed in a highly vascular membranous sac, and

the process of calcification or hardening commences.

CALCIFICATION OR HARDENING.

At about the fifteenth week of embryonal life the crowns of some of the teeth will commence to calcify, but not with the same degree of hardness in all parts of the crown, for it will be remembered that enamel and dentine vary in their density, and the process of calcification, although occurring in both structures almost simultaneously, has been so ordered by an All-wise Creator, that the different structures shall receive different degrees of hardness, in order to render them of service to their possessors.

The dentinal papilla and enamel organ are separated by a membranous structure, and from this dividing structure the process of calcification commences. In the enamel organ the hardening will progress outwardly, until it reaches the sac previously mentioned, or until the whole enamel organ is calcified. In the dentine the process will progress inwardly but it will not embrace all of the structure. The teeth previous to calcification were flesh-like bodies, and in a previous chapter the pulp was described.

As the process of calcification progresses in the dentine inwardly, this flesh-like tooth is changed to bone, but the central portion of the papilla, which

has been more or less connected with the process of hardening, is not calcified, and thus in the center of every perfectly formed tooth, there can be found a cavity, which contains a remnant of the original papilla generally known as the pulp.

After the crowns are thus completed, they are ready for dentition. The process is of course subject to variations, but the general character of formation can be determined from the foregoing. Those who desire more specific information will find the subject of unusual interest.

The oft repeated question of "why do teeth have nerves?" is practically answered by asking in return, how could we have teeth without nerves?

COMPOSITION.

In describing the structure of teeth it was stated that they have a living or animal part, and an earthy or mineral part.

The animal part includes the pulp and its fibrils, and is also found in intimate combination with the mineral part. It is possessed of the same general composition as other organic parts of the body; such as albumen, fibrin, casein, &c., and is therefore under the same general law which governs all living tissues.

The animal part may become diseased and die

without destroying the tooth it inhabits, but destruction of the animal part will generally produce other forms of trouble which are equally as bad, and generally worse than decay. Death and decomposition of the animal part, often gives to teeth a dark, dead color, which is not only unsightly, but which frequently is the source of serious disturbances and diseases.

The animal portion of teeth is an extremely necessary part, and by referring to tables in the appendix, it will be seen that it constitutes over one-quarter of the dentine, and over one-third the cementum. Only a trace, or one or two parts in one hundred, is found in the enamel. (See appendix C.)

The mineral part includes the Dentine, Cementum and Enamel.

PHOSPHATE OF LIME.

The principal substance which enters into the composition of the hard or earthy portions of teeth is lime. By referring to tables in the appendix it will be seen that the phosphate of lime constitutes more than three-fifths of the dentine, more than one-half of the cementum, and nearly nine-tenths of the enamel. (See appendix D.) Phosphate of lime, is a chemical combination of phosphoric acid and lime. These materials are present in varying

quantities throughout the animal and vegetable kingdom, and are especially present in proper proportions in all natural food, or in all articles intended by the Creator for the nourishment of the body.

From the foregoing it will be observed, that without life a tooth is liable to become a source of the utmost annoyance, and that the preservation of a tooth depends upon the integrity of its structure, both animal and mineral. A deficient or imperfect structure of either part will weaken the whole tooth.

After teeth are once fully formed they do not materially change, therefore the importance of understanding their structure, composition and requirements, and the necessity of protecting them very early in life can not be overestimated.

HOW TO DISCOVER THE TWO STRUCTURES.

The two portions—animal and mineral—are subject to decay from different sources, and the perfect preservation and integrity of the teeth can only be maintained by a careful attention to both kinds of structure.

The animal constituent may be easily discovered by placing a tooth or bone in a diluted solution of nitric or muriatic acid, and steeping it until the earthy part is dissolved; the part left will be a tough,

pliable, gristle-like substance, which is the animal part, but retaining the original form of the tooth or bone.

The mineral part may be obtained by subjecting the tooth or bone to a strong heat in an open fire, or by boiling it in an alkali, "lye," or soda, until the animal matter is destroyed, or consumed. The part left will be a white, brittle, light and porous substance, which is the mineral part, but which will also retain its original shape.

Both constituents remain unaltered in chemical composition, even after a lapse of centuries.

THE TEETH SUBJECT TO NATURAL LAWS.

Perfect tooth structure depends upon primary elements, and the health of the teeth depends upon individual attention—therefore the importance of understanding both structures is imperative.

The same laws which control other parts of the body, also control the teeth, and even when perfect teeth are found, there must be continual watchfulness to secure their preservation.

In some cases a weakened or deficient structure will continue for a long time without causing a total loss of the teeth ; but in nearly all cases where there is a predisposition to decay, it will require a systematic, and persistent treatment to carry them safely

to manhood or womanhood. The teeth of nearly all civilized men inherit special tendencies to destruction. The causes of their early decay are primarily constitutional. Diseases and defects have been accumulating for generations, and where one person can claim immunity from them, there are a thousand who are suffering from some form of transmitted trouble, which not only manifests itself in defective teeth, but in the thousand and one other ills to which the flesh is heir. Troubles with the teeth are only a small part of our inheritance.

The various organs of the body are the workmen employed by nature to perform important services. One part cannot be overworked without producing discomfort or disease. If other organs are employed to perform the work which naturally belongs to teeth, the result must be in the end disastrous to the overworked organ. The natural teeth are the only natural organs for preparing and mixing food.

Under the present condition there are unnatural tendencies to early destruction of the teeth, and having briefly outlined the character, described the structure and formation, and shown that the integrity and soundness of the teeth are necessary to their preservation, we will now proceed to notice some of their more immediate sources of danger.

CONSTITUTIONAL

SOURCES OF DANGER,

SOURCES OF DANGER.

CONSTITUTIONAL SOURCES.

While considering the different sources of their destruction, it must be remembered that although all teeth are liable to decay all are not equally influenced by disturbing elements. Some of the most unpromising teeth frequently last the longest, and this is accounted for by their having inherent powers of defense, and peculiarly favorable surroundings.

The constitutional sources of trouble with the teeth arise from improper or imperfect formation or calcification, and from inherited or acquired weaknesses.

The first source of degeneration is hereditary, which of course requires preventive treatment corresponding to the character of the source.

The second source is a lack of lime, or of proper

material in the formation of the teeth, and an insufficient or improper nourishment after formation.

Dr. Meredith, in his Lecture upon "The Teeth," says:

"Enough has been spoken and written at various times upon the abuses of civilized life, and especially of refined society, to induce us to confess that the constitution of man has deteriorated, and that the teeth have shared in the degeneration of the organism. One of the most conclusive proofs of this is found in the fact that scientific travelers visiting various nations in different parts of the globe have reported that those people who breathe a pure atmosphere, who drink pure water and eat unadulterated food, who take healthful exercise and sufficient rest, who dress in a manner that favors free respiration and free movement of the body, are wonderfully free from those diseases that are so common among people of more civilized nations, and possess teeth that are seldom, during a long life, attacked by any disease.

It is a reasonable assertion, then, that if we would endeavor to imitate the healthful manner of living of these nations—which we could do very nearly and still retain all of our claims to civilization—if we would eat, and compel or children to eat, bread

made of unbolted flour, and other things containing a liberal amount of the phosphates, we could make a decided impression for the better upon the teeth of the following generation. If that generation would pursue the same course, and so on, it would not be many years until the teeth would be restored to their pristine soundness and perfection. But people seldom bestow any thought upon this subject until they are forced to do so by the condition of their own and their children's mouths. At that time it is too late to change the construction of the teeth by anything that they may do, and too little interest is felt in the welfare of humanity several generations afterward to induce them to make any radical change in their manner of living, or to leave the beaten track of favorite habits and customs."

Thus teeth which are constitutionally weak and predisposed to trouble, can be made stronger and freer from danger, by careful and persistent attention to their requirements.

It is frequently asserted by patients that their teeth ought to be good, for their parents both had exceptionally good teeth, which lasted an unusual length of time. Even granting that the trouble in these cases is something out of the general order, it

does not follow that perfect tooth structure will be inherited, any more than any other peculiar or general condition of the mental or physical organization. A tendency to destruction may commence late in life.

A constitutional weakness of any kind has a tendency to weaken the teeth. It will be remembered that a considerable portion of every tooth is alive, and is subject to the same influences, and may be under the same conditions as other parts of the living body, and yet the harder portion of the teeth may be so perfectly formed that the teeth will remain the only reliable or serviceable organs of the body.

IMPERFECT STRUCTURE.

Thus it can be seen that the primary sources of all troubles with the teeth arise from imperfect structure. That an insufficient supply of the phosphates weakens the denser structure, and an improper nourishment weakens the animal, and in fact the whole structure.

The constitutional sources of danger which are under individual management are intimately connected with the forms and habits of daily life.

These sources of trouble can only be combatted by a strict regard for nature. Whatever nature de-

mands for the building or preservation of the body, she must have, or else the bodily system will suffer according to the amount of material of which she is deprived.

The habits of life embrace the use and abuse of exercise, sleep, apparel, shelter, and diet, &c., &c. Food constitutes the most important item for us to consider; for with improper nourishment, all dangers of physical degeneration from other causes will be greatly enhanced. The other causes must be treated according to the requirements of each. In considering the subject of foods great liberty will be taken with various reliable authorities, and the statements made will be carefully selected on account of their practical information.

FOOD.

"In order to form good teeth, the proper materials must be used, otherwise they will be defective in their structure and liable to early decay."

The teeth and bones, however, are only one part of the body requiring proper and constant nourishment. For complete nutrition, man must have in his food the materials of which the body is composed, or substances which can be readily converted by the processes of nature into blood, muscle and bone. (See Apppendix E.) All substances

taken into the system for food should contain life-giving or life-sustaining principles. (See Appendix F.)

It is not intended to notice all the different forms of food, their usefulness or their inefficiency. Only a general notice of what is required to form good teeth will be attempted.

Foods are derived from all the great divisions of nature and natural products, from substances which are living and organic, and substances inanimate and inorganic. There are different qualities of foods, which render them particularly fit for different ages, climates, seasons and conditions of life, but there are certain essential qualities, which are positively necessary to render them of any value to human beings at any age or in any condition. (See appendix F.)

Food is required by the body for two primary purposes, to generate heat, and to produce and maintain the structures of the body.

Edward Smith says in his work on "Food:"

"It is understood that the structures of the body are in a state of continual change, so that atoms which are present at one hour may be gone the next, and when gone, the structures will be so far wasted, unless the process of waste be accompanied

by renewal. But the renewing substance must be of the same nature as that wasted, so that bone shall be renewed by bone, and flesh by flesh, and hence whilst the body is always changing, it is always the same. This is the duty assigned to food, to supply each part of the body the very same kind of material that it lost by waste."

NUTRITIOUS FOOD.

No single article of food is sufficient for the continual nourishment of the body. To be completely nutritious the food must contain not one, but all the substances required, and these substances must be present in their true proportions. It is, however, of great interest to note how frequently all necessary substances are combined in one food. Early in life milk is all that is required, and later in life, bread and meat. "Bread is in vegetable foods, that which flesh is in animal foods, and each within itself contains nearly all the elements required for nutrition." (See appendix G., H.)

The individual for himself, or the parent for the child should understand the great value to be attached to wholesome and nutritious food; and the reader of this little work is especially cautioned to notice that food should abound in the earthy compound so necessary in the teeth. The teeth require

food containing the inorganic or earthy constituents in particular, in order to maintain the mineral and protect the animal structure.

The influence of appetite, or the relish for the article, plays an important part in the phenomena of nutrition.

The articles in common use which contain tooth and bone sustaining elements are numerous, such as milk, eggs, fish, oysters, and the muscular flesh of animals; wheat, rye, oats and potatoes; and many fruits. All these substances contain more or less of the phosphates. Ordinarily the use of lean meats, flour made from whole wheat, pure milk and potatoes, will support life, and renew the physical organization. Deviation from the necessaries of life is generally at the expense of some part of the bodily system. No part of the body should be deprived of its proper nourishment. Delicacies or any form of artificial food should be used sparingly and only in combination with natural food. (See Appendix F, G, H, I, K.)

DIGESTION OF FOOD.

A structure with a perfect foundation cannot be permanent, if it is not kept in continual repair. The modern methods of preparing natural food, often deprive it of its most essential quality, and the

thousands of preparations which are compounded to render natural food attractive to the taste or to the eye, are in themselves a frequent source of trouble. The modern appetite cannot always be relied upon with a full degree of security. Nutrition does not depend so much upon the ease of digestion, as upon the degree of digestibility. Let any person try the experiment of satisfying a hungry, perishing body, with any of the countless number of modern artificial dishes, such as corn starch, blanc mange, sweetmeats, cake, pie, puddings, &c., &c., and see how long they can survive, without the more substantial forms of food.

THE GREAT AIDS TO DIGESTION ARE

1st. Proper selection of food according to the taste, digestive power and requirements of the individual.

2d. Proper treatment of it as regards cooking, flavoring and serving it.

3d. Proper variations of it, both as to its nature and treatment, so that the appetite may not fail, or be wearied.

4th. Exercise, warmth and a genial disposition.

5th. Regularity of meals, with a proper interval between them, and sufficient time to enjoy them.

CLASSES OF FOOD.

Food is commonly classed as animal and vegetable.

ANIMAL FOOD.

Animal food is obtained from various species of living things, such as cattle, sheep, deer, birds, fishes, &c., &c. The difference in meats and in their nutritive values arises from the varying proportions of their chemical composition and mechanical texture. "Whatever renders the animal fibre harder makes the meat less digestible; whatever renders it more delicate and tender, more easily separated and disintegrated, makes it more easily soluble in the juices of the stomach."

Of all meats in ordinary use, mutton is the most readily digested, and beef the next. Veal and lamb are less digestible than either beef or mutton. Venison is the most tender and digestible, and pork is the most refractory of all meats. The fat of meats generally, is difficult of assimilation. (See Appendix I.)

The mode of preparing meat has a great influence upon its digestibility. Broiling is conceded to be the most satisfactory, and frying the most objectionable—broiling, roasting or boiling, preserves the juices, and renders the meat more savory

and tender. Frying destroys the juices, and generally the meat.

The proper application of heat is a fundamental consideration in cooking meats. Generally, the sooner the crusting process is effected, the better will be the result. The proper mode is to employ such measures as will render the whole mass of meat soft and tender, and retain its natural elements, juices, flavor, &c.

Fat meat is heat generating alone, while flesh is both flesh-forming, and heat-generating. Beef is popularly regarded as the most nutritious of all flesh food, and undoubtedly when it is in perfect condition, and properly prepared, it is superior to any other meat in point of economy and usefulness. It is easily digested and assimilated, and contains many of the required elements for renewing the structures of the body.

BREAD.

Vegetable food is obtained from various vegetable growths, or living plants. (See appendix K.) Without describing the grains, vegetables and fruits in common use, we will pass directly to the most important, as it is the most universal of all vegetable foods.

Dr. Edward Smith, in his able work on Foods,

says: "It is probable that the health and bodily vigor of the inhabitants of temperate climes are more attributable to this food than to any other single cause." Appreciating the truth of this statement, considerable space will be devoted to the consideration of wheat flour, and the different forms of preparing it.

Of all articles of food, bread is the staff, or main dependence of all classes and conditions of people.

Bread is made from certain species of grain. "Different nations use different kinds of bread. In the United States, fine wheaten flour is almost exclusively used. In England the same, although the rural population use more or less oat meal. The Irish use potatoes very largely. The French in cities, wheaten flour, the rural districts more rye and unbolted wheat. The Germans use largely of rye, of which the black bread is made. The black loaf is the principle ration of the Russian army, and the bread of the mass of the population. The hard-working Scotch live almost exclusively on oat-meal."

Wheat contains the life-sustaining elements in greater or better proportion than any other grain, or vegetable growth. (See appendix H.)

The manner of preparing wheat, however, decides its usefulness as an article of food. The fol-

lowing, (taken by permission, from a work entitled "Familiar Lectures about the Teeth," by Professor H. S. Chase, of St. Louis,) contains so much practical information within a small compass, that it is produced for the benefit of all concerned:

"I think one very great cause of the poor teeth of Americans is that they use such a large proportion of superfine flour as food. Especially is this the case with the women, whose principal diet is bread and butter, cakes, pies, puddings, blanc mange, corn starch, tea and coffee. A person would sicken and die in a short time if fed upon starch alone. Starch is found in all kinds of food, especially the grains. But when we separate starch from the other elements with which it is combined, then it is not fit for the support of life.

Fine flour is about seventy-five per cent starch.

A bushel of wheat weighs about sixty pounds. The millers make about forty pounds of flour out of this. The remaining twenty pounds, which is the more nutritious, is sold for cattle feed. Some of it is made into a dark-colored flour and sold at a lower price. This twenty pounds remainder generally goes under the name of middlings, shorts, bran.

Let us examine a kernel of wheat. We cut a

thin slice out of the middle and place it under a magnifying glass. Commencing at the outside we see a ring encircling the slice; this is the outer bran coat. Next to this, inside, is another ring, the inner bran coat. Within this ring is a circle composed of gluten cells, only a single row of them. These cells are like little beads; inside the ring of gluten cells is a broad area of starch cells. In the gluten cells is contained nearly all the phosphate of lime there is in the kernel of wheat. The gluten cells are dark colored. The starch cells are glistening white. (See Figure 8.)

The gluten cells make the flour dark if left in it, and bread made of it is also dark colored. Most ladies despise dark bread; most gentlemen are fond of it. But the ladies rule, and the millers endeavor to get rid of the gluten cells to please the ladies, and sell their flour at the highest price. Therefore, in grinding the wheat for fine flour, they avoid cutting up the bran coats of the wheat. They crush the grain, leaving the bran coat as entire as possible. The gluten cells mostly adhere to the bran coat, when the grain is thus treated, and the miller is thereby enabled to separate the starch cells very perfectly in bolting.

In what is called Graham flour, the wheat should

be ground so that the bran coat shall be finely cut up, so as to be thoroughly mixed with the starch cells. The latter, of course, makes a dark bread, sweet, nutritious, and not robbed of its phosphates. Chemical analysis shows that there is five times as much phosphate of lime in Graham flour as there is in superfine white flour. Mayer, a German chemist, found fifteen times more phosphoric acid in the whole berry than he did in the fine flour.

It is hereby shown that the fine flour is not a nutritious article in the highest sense.

To be sure, fine flour is not poison. One may eat it all his life and be healthy. But the lack of phosphates in the flour must be made up by partaking of other food rich in phosphates. Thus we find that persons who eat largely of meat and vegetables, and use fine flour, do not suffer in health; but those persons who live in an opposite manner do invariably suffer in general health, and particular organs. And therefore, it behooves every mother to eat such food, while a child is dependent upon her for nourishment, as will not only supply the waste of her own body and that of her child, but will be sufficient to serve the purposes of growth."

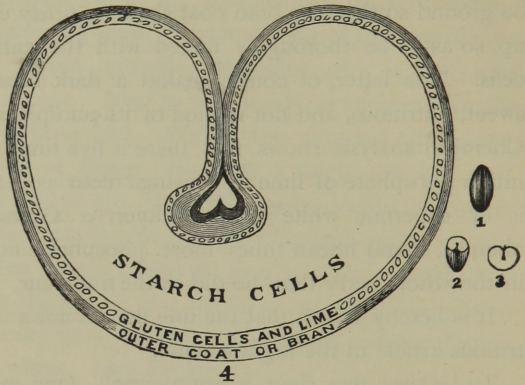


FIGURE 8.

KERNEL OF WHEAT.

1. Natural size.
2. } Cross section, cut midway between the two ends.
3. }
4. Same as No. 3, enlarged about eighteen diameters, and exhibiting the location and relative thickness of the three parts.

PATENT FLOUR, PURIFIED MIDDLINGS AND BREAD.

Of late, however, and since the foregoing was written, many valuable improvements have been made in the manner of making wheat flour, so that it is possible to procure fine flour which contains a good degree of the phosphate element. The gluten cells containing the lime are separated from the outer coat or shell by a "patent process," and afterward added to the starch cells, thus more nat-

urally combining the two properties, and forming a more nutritious article than could be obtained under former processes. The product secured after mixing the two, is sold as "patent flour" under different brands.

The two outer parts before being treated to the patented process, are generally known as "middlings," and bran, and the material secured after it has undergone the process, is known as purified middlings. The purified middlings have a rich, golden color somewhat resembling very fine corn meal. They impart a delicious, rich flavor, and preserve the freshness of bread, besides improving its general qualities.

The quality of the "patent flour" will largely depend upon the variety of the wheat used. The best flour is made from wheat having the largest proportion of the phosphate element. Millers also grade the patent flour according to the percentage of the phosphates contained in it. The best grades contain the most, and the lower grades the least of the purified middlings. Consumers will notice the distinction.

Spring wheat probably contains more phosphates than winter wheat.

Careful tests have demonstrated that there is

twenty-five per cent more phosphates in good "patent flour," than is usually contained in ordinary flour.

Bread is readily and quickly digested and assimilated, but it should not be eaten until the toughness incident to baking has passed away, or until the process of mastication can readily separate its particles. New bread is often eaten rapidly and swallowed in lumps, without proper mastication or proper mixing with the secretions of the mouth.

The effect of cooking should be to soften and disintegrate the substances which are naturally too hard for digestion, and when cooking interferes with this result, changes in the process are demanded. The introduction of patent flour and German or pressed yeast have been of great service in the preparation of sweet and nutritious home-made bread.

FLOUR, YEAST, BREAD.

The following selections are taken at random from E. N. Horsford's Report to U. S. Government, on Vienna Bread, and as the report is an official document upon some of the most important articles used for food, and as the report is not easily procured it is quoted from at some length, for the purpose of placing practical information about bread

before dental patients, but more especially before lady patients, who are always more or less interested in bread making:

"In view of the above, it is obvious at a glance that, as the interior of the berry contains so little ash, the flour owes its mineral ingredients, when it contains them in considerable proportion, to what it derives from the interior investing coat—the coat containing the sacs of gluten and phosphates. These sacs, detached from the gluten-coat, carry with them the mineral constituents they contain to the flour. It is obvious at a glance, also, that a system of milling is better, generally speaking, in proportion as it contributes from the bran the sacs of this inner coat containing the gluten and phosphates, while leaving behind all that lies outside of this gluten-coat."

Down to the beginning of this century, the construction of flouring mills was exceedingly simple. There were a single pair of millstones and a single bolt, of which the motive power might be water or wind, horses or cattle. Everything else must be accomplished by manual labor, and the conveniences consisted of some shovels, barrels or tubs, and sieves. The wheat was usually ground in a wet condition, as moisture increased the toughness

of the bran and prevented it from being reduced to fineness, and so promoted the whiteness of the flour. In the early part of this century, the first decided improvements, which ultimately resulted in the process of high milling, were made in the neighborhood of Vienna.

The extreme low milling is a system of mashing and repeated scraping and squeezing and a single bolting. It is attended with heating of the product, which injures the flour.

The high milling is a system of successive crackings with alternate removal of the finer particles and the bran as fast as produced. It is attended with but little heating of the product. There is some cracking in low milling, and some mashing in high milling.

The half-high milling, as its name imports, partakes more of the cracking than low milling, and more of the scraping and squeezing than high milling.

The cylinder-milling is a system of pressing and cracking, and, where the cylinders are grooved and move with unequal velocities, of tearing. Like the high milling, it produces little heat.

Another device has been contrived for separating the minute bran scales from the grits of equal size,

by causing a broad stream of air, either by blast or suction, to pass through a slightly-inclined plane sieve of meshes sufficiently large for both the bran and grits to pass through; the force of the blasts being so gentle as to permit the grits to drop, while the particles of bran are kept afloat to be discharged at the lower margin of the sieve. The sieve is sometimes disposed around a cylinder, and the action promoted by a brush acting upon the surface of the sieve, in connection with the blast or suction. Of this class, several of most ingenious construction, under the name of middlings purifiers, have been recently invented and brought into use in this country.

The finer bran of the middlings, after passing through the middlings purifier goes into the "feed." The coarse bran goes to the bran-duster. The white interior having been detached from the hulls, is conducted back to re-enter the whole meal on its way to the bolts. The middlings (grits) may be ground separately or discharged with the purified and pointed wheat directly into the run of stones."

"Upon comparing these sections with each other, it will be seen that the structure of the different grains that have served from time immemorial as the material for the supply of farinaceous food of

the world, has certain great distinguishing characteristics.

Within a series of layers of woody fiber, serving for the protection of the nutritious interior, and otherwise comparatively worthless, we have one or more layers of cells, containing the nitrogenous compounds and phosphatic salts, which serve the most important purposes of nutrition, as they largely furnish the materials for the various tissues of the human organism; and within these layers, to the center of the grain, a mass of starch granules, larger and lesser, and cells containing albuminoids, supported in a loose frame-work of cellular tissue.

The art of milling in its perfection consists in the disintegration, not destruction, of these tissues and cells, and the removal from them of the woody fiber. This is more perfectly accomplished in the milling of the wheat than in that of any of the other grains, with perhaps the exception of the rice, and yields the whitest, and to the palate the most acceptable flour."

CHARACTERISTICS OF FLOUR.

The best winter wheat flour has a faint, pleasant aroma; is dry, heavy, by transmitted light having a light shade of clear, brilliant yellow, and readily balls in the hand. An inferior article, when pressed

in the hand, shows a quality of adhesion, retaining the form imparted by the pressure. The best spring wheat flour when pressed in the hand will shoot out between the fingers like dust

BREAD.

Bread in its widest signification comprehends all the forms of farinaceous food which have been subjected to the processes of the culinary art. It embraces, besides loaf-bread, rolls and biscuit, the cracker, the merely boiled dough, the griddle-cake, and the numerous fanciful forms of farinaceous confectionery. For the most part, when fitted for consumption as food, these different forms have received a cellular structure, and are light. The practical advantage of this porosity is that when eaten, the digestive fluids—the saliva and gastric juice—readily penetrate the mass and promptly perform their function. The objection to "heavy" bread is that its digestion is retarded, and this is because the digestive fluids come in contact only with the outside of comparatively large masses; the absence of cellular structure preventing their penetration to the interior.

The superior digestibility of porous bread was known to the ancients, but because its preparation required the use of flour already in a state of fer-

mentation and decay, which filled the mass with bubbles and was offensive to smell and taste, it was proscribed from sacred uses on account of its conceived impurity. For these purposes unleavened bread, which was a sort of Graham wafer, was required. This was mainly a product obtained by heating to a baking temperature a thin layer of paste made of whole meal or cracked grains and water.

The term bread in its more limited signification, is applied to porous loaves and rolls. If the product contain butter or sugar, or spices or perfumes, or fruit, it is pastry, cake or confectionery rather than bread. There are exceptions to this definition. The mixed rye and wheat bread of Austro-Hungary, and the inferior roll and 'Semmel" bread have sometimes, to disguise the odor or taste, a few caraway seeds.

To secure the cellular structure of the bread, it is necessary that the flour should have a constituent which, when moistened with water at common temperature, shall possess two of the properties of India-rubber, tenacity and elasticity; and that these properties shall, in a great degree, be lost on subjecting the moistened flour or kneaded dough to a certain elevated temperature. This body, which

nature has provided in the cereals, is gluten, and in wheat it is associated with a mass of starch of remarkable whiteness and purity, and yields, when properly prepared, and the baking processes are properly conducted, a product exceedingly grateful to the palate. This palatability in the best forms of bread is partly due to the changes wrought in the starch of the interior crumb, which is largely a mere physical, not a chemical change, and the changes which take place in the starch and gluten of the exterior crust, due to incipient destructive distillation, or roasting, and partly to the absence of special or marked odor and taste in the bread as a whole.

FERMENTATION.

The knowledge that whole meal wet with water, will go into spontaneous fermentation must have been coeval with that of the first use of leavened bread. The philosophy of the changes which the flour undergoes in fermentation is of comparatively recent study and practical development. That a small portion of flour already in process of active fermentation would, when mixed with fresh flour and water, cause it to go into more prompt fermentation than when left to spontaneous change, must also have been known at an early period. Upon

this was based the practice of setting apart a portion of the dough of each batch of bread to be employed in raising the succeeding batch, and this process prevails largely over the world to this day.

EFFECTS OF FERMENTATION.

The action of the acids of ferment is well known. They tend to liquefy the gluten, and deprive it of its tenacity and elasticity. It is also well known that dough too far advanced in fermentation (old leaven) yields offensive products both to the taste and smell, including butyric ether and other offensive products."

PROBLEM OF A BREAD YEAST.

It will be seen from the foregoing that the problem of a bread-yeast is the production of a yeast-plant capable, within a limited time, of producing only alcohol and carbonic acid; the alcohol by itself producing comparatively little effect upon the dough, and the carbonic acid serving only by its production of cellules or pores, in every part of the interior of the mass of dough, to give the bread lightness. Such a yeast was the ideal yeast sought by the Vienna bakers, and for which they offered their prize, won by Mautner, of St. Marks, Austria.

THE PRESS-YEAST.

Historically, the press-yeast dates back to 1837,

and the introduction of the yeast from beer, only to 1817. Up to that time the sour dough, and a mixture of sour dough and hops obtained by boiling, were the instrumentalities for producing porous bread throughout Austria and Southern Europe. At this time in Vienna there was introduced by the bakers a roll made with a finer quality of flour by the process of *sweet fermentation*, (that is, with yeast,) which was called the imperial roll, (*Kaiser-Semmel.*) From this time to 1840, nothing new appeared, though there was constant demand for the sweet fermented rolls. At length a prize was offered in 1845 by the Association of Vienna Bakers, (an association which has kept its records *from the year 1452 down*,) for the independent production of a good yeast, and the trades-union recognizing the importance of the object, offered to the discoverer the loan of its great gold medal. The offer of these prizes met with success in 1847. Adolf Ignaz Mautner succeeded in producing the desired article, and in 1850 the prize and the medal were awarded for the production of his cereal press-yeast. From this point on, the baking-industry made rapid development throughout the Austrian empire, and at the Paris Exposition in 1867, the Vienna bakery was recognized as the first in the

world. Vienna may therefore properly claim the double honor of having been the seat of the first development of the art of high milling, and the birth-place of the use of press-yeast.

PREPARATION OF THE PRESS-YEAST.

The press-yeast is obtained by skimming the froth from the mash in active fermentation, which contains the upper yeast, and repeatedly washing it with cold water until only the pure white yeast settles clear from the water. This soft, tenacious mass, after the water has been drawn off, is gathered into bags and subjected to hydraulic pressure until there remains a semi-solid, somewhat brittle, dough-like substance. This is the *press-yeast.* It is then resolved into packages of definite weight up to four pounds, and wrapped in paper, and supplied to the market. Such yeast in summer will keep for eight days, on ice."

THE QUESTION OF SIZE OF LOAF.

"The Vienna bakers recognize in its fullest significance the proper relations between the crust and the crumb; so fixing the size of the mass of dough and so fixing the temperature of the oven that the bread when taken from the oven shall, every part of it, crust and crumb, be thoroughly cooked, none of it burned, and the whole, when warm, have an

agreeable aroma, and, when cold, but fresh, shall be palatable in the highest degree without the addition of butter or edibles of any kind whatsoever.

CAN WE HAVE VIENNA BREAD IN AMERICA?

The answer in general is, we may. To assure it, we must have, first, as good flour as the bakers of Vienna have; second, we must use the press-yeast; and, third, we must pursue the same processes of preparing the dough and baking.

Good flour can only be made from sound, pure wheat, and having the wheat to start with, by good milling; and this means, in general, flinty wheat reduced by the process of high or half-high milling, and a selection of the products of the milling, not to exceed one-half of the total weight of the wheat ground. Good fresh middlings flour would compare favorably with the average Hungarian flour.

Press-yeast is now produced in this country. It should be of recent preparation; sweet, so that it will yield only alcohol and carbonic acid as products of fermentation.

The sponge should be made with a mixture of half milk and half water. The proportion of the ingredients, temperature, and the processes of preparation of the dough in bulk and detail as given in general, are:

8 pounds of flour;

3 quarts of water and milk in equal proportions;

3½ ounces of press-yeast;

1 ounce of salt.

TIME REQUIRED FOR BAKING.

The baking requires an oven of no especial complexity, but should be capable of maintaining a constant temperature of about 500° Fahrenheit.

The loaves should be of size to require not more than from 15 to 20 minutes to bake completely; that is, to thoroughly cook the interior by the time the outside has assumed a delicate thin reddish or cinnamon-brown crust, and become palatable in every part. If eaten at its best, that is, soon after it has cooled, or at least during the day of its preparation, it will not fall behind the average first quality of Vienna *Kaiser Semmel.*"

PHOSPHATIC BREAD.

All improvements in making bread point to its being eaten fresh, but not warm. This necessity makes urgent the adoption of a process by which the labor of making the bread for household consumption shall be reduced to a minimum. Either the bread must be produced by a public baker, where the waiting time can be utilized, or the yeast process must, in private families, give place to a

method which does not require the time and the care of this process, such as the process of self-raising flour.

With all its excellencies and attractiveness, the Vienna bread is not as nutritious as the rye-bread or as the brown wheat bread.

The two most important nutritive constituents of the wheat are the albuminoid bodies, largely lodged in the gluten-coat of the grain, and the phosphates, which are associated with them. Both these constituents are largely lost from the flour both by the high and low milling processes.

A glance at these results will show why the peasantry of Austria and Hungary, and, indeed of Europe in general, prefer the black bread made from the whole meal, because of its greater nutritive value—because the laborer can be sustained on the black bread and cannot on the white. The consideration of these conditions led the late Baron Liebig to remark as follows:

"The significance of the nutritive salts in food is sufficiently well known to physiologists; it is known that without their co-operation the other constituents of the food are incapable of affording nourishment.

By simple washing of fresh or boiled meat with

water, which abstracts the nutritive salts, it would become incapable of serving in the preservation of life; the nutritive salts of wheat are identical with the nutritive salts of meat, and one understands that what is true for meat must also be true for bread, and that the nutritive value of flour is less in the same proportion as it contains less of the nutritive salts than the grain.

The nutritive salts of meat and wheat are phosphates, and consist of compounds of phosphoric acid with potassa, lime, magnesia, and iron; the simple relations of the quantity of these substances, contained in wheat and flour, as shown by chemical analysis, will be sufficient to make obvious the differences in the nutritive value of the two," etc.

The researches of Magendie, made many years since, established beyond question the superiority, for purposes of nutrition, of the bread made from whole meal, as compared with bread made from the fine flour. He found that while dogs fed upon white bread alone after a time became ill, lost strength, and ultimately perished, those fed upon bread made from whole meal lived in health indefinitely long.

Chossat found that absolutely clean wheat—wheat that has been washed to remove any traces

of calcareous earth adhering to its surface, would not sustain pigeons in health when supplied in addition with absolutely pure water only. After a time their bones became thin and frail, and were unable to bear the weight of the birds; the phosphate of lime of the bones having been transferred to sustain the activity of organs more essential to life. They ultimately perished. Pigeons fed upon the same wheat and the same pure (distilled) water, and having access to lime compounds, continued in perfect health. Even those pigeons which had nearly perished from having been fed only upon the diet first mentioned, upon being supplied with carbonate of lime, were wholly restored to health.

It is well known that the peasantry, not of Austria only, but of all Europe, and a large proportion of the middle classes, habitually eat because of its nutritive value, brown bread; that is, a bread containing the bran with its phosphates. The higher classes in England prefer, two or three times a week, as an article of luxury, wheaten bread made from whole meal.

The nutritive value of oat-meal, and of the porridge made from oat-meal groats, an established dish upon the breakfast table of Scotland, is well known.

The bread made from whole rye-meal, the *Pumpernickel* of Westphalia, containing all the phosphates due to the normal grain, is widely used by the best classes in Germany.

The rice which is the great staple of food for so large a fraction of the oriental world, contains twenty per cent. more phosphoric acid in its ash and twice as much lime as the average wheat.

The Indian corn, the meal of which, wrought into the various forms of farinaceous food, has long been the basis of so large a proportion of the nutrition of the labor of the South in this country, differs but little in its per centage of phosphates from whole wheat.

These phosphates are indispensable in the nutrition of all higher organisms. They enter into, and constitute a part of, not only the bones, but every muscle, every nerve tissue; and in each secretory organ there seems to be a special accumulation, to be employed in the elaboration of the products which are secreted.

The observation that cattle prefer grass grown in meadows enriched with ground-bone is in keeping with the practice, now well known, of feeding cattle upon bone-meal."

USELESS FOODS,—BUCKWHEAT, ETC.

The daily use of a variety of food is to be encouraged, but there are certain articles in common use, supposed to be valuable, which are in reality worthless.

None are more deceived than those who freely use buckwheat, or consider its use beneficial to the human system, or indeed of any nutritive value. In this northern section of our country, more especially during the colder season, flour made from buckwheat, constitutes the principal article of food for breakfast in many families. The usefulness of this article in the human system for any purpose is extremely doubtful, and its influence upon the teeth, if not positively injurious, is in no manner beneficial. It is generally adopted for a morning diet, from a lack of something more palatable. It is continued from season to season by habit, and not from any natural craving.

The many physical disturbances which frequently follow even a moderate use of this article, are undoubtedly familiar to most readers, and its marked effect upon the teeth has induced the writer to enter his protest against an over indulgence in it, and even to recommend that its use be entirely discon-

tinued, especially in all cases where there is a marked tendency to troubles with the teeth.

Analysis of buckwheat does not reveal any dangerous element. Its composition does not indicate any dangerous combinations, but its character must be judged by the effect it produces. That it does produce a variety of disorders, and that it is a questionable article of food, is undisputable. (See appendix H.) It is well known that honey made from buckwheat, is usually dark, and often disagreeable to the palate. Buckwheat when fed to swine, sheep and other animals, frequently produces peculiar conditions resembling cramps, intoxication, etc., and when used by man it often produces peculiar physical disorders, disagreeable sensations, and even eruptions of the skin. Chambers' Encyclopedia says, "when bread made from buckwheat forms the principal food of the people it is thought to have an injurious action on the brain."

The culture of buckwheat is profitable to the farmer, as it does not exhaust the soil, and it destroys or chokes the weeds. It is therefore useful in preparing new land, but it is an expensive article when its nutritive value is considered.

The bodily system requires a certain amount of

nourishment daily, and when it is supplied with unnecessary articles to the exclusion of the necessary, it will be weakened and its health endangered.

Useless articles consume strength in digesting them, and fail even to support the existing condition, thus impairing and wasting bodily health and strength.

The articles usually eaten with buckwheat, such as fats, syrups, etc., may possibly have something to do with its injurious tendencies, but the fact of its causing the disturbances mentioned above without any accessories must convince all, that a continued use of the article under any circumstances is deleterious.

The other articles may posibly increase the trouble, but they do not produce it.

The use of buckwheat, although limited to a minimum quantity, is to be condemned simply as a waste of digestive force, if not for its absolute injuriousness to the teeth and body.

HYGIENIC GRIDDLE-CAKES.

In order to discourage the use of buckwheat, and to encourage the use of a better and more desirable article, a formula for griddle cakes is given in the appendix. (See appendix L.)

Hot griddle cakes are to be more or less con-

demned; but the formula given is not so much for the purpose of furnishing a delicious and palatable dish, as to furnish a useful substitute for a common and useless article of diet.

The formula given may be varied to suit the taste or fancy of individuals, if the bone-producing, bone-supporting element, the outer part of the interior grain, is only retained.

The purified middlings which compose the principal part of the cakes, may also be added to flour, and thus increase the bone-sustaining element in bread. More or less may be added, according to individual necessities, taste, etc. They are not offered for general sale, and can only be procured from mills where the "patent process" is employed, therefore consumers are cautioned to obtain from reliable dealers, and to be particular to ask for the best purified middlings.

SUGAR, ETC.

In this connection, it will be in place to say a word in relation to other articles of food which are popularly considered dangerous to the teeth. (See appendix L.) It must be remembered, that at the present time, the markets are filled with adulterated articles. It is almost impossible to procure any form of food, in a pure or natural state. Sugar,

syrup, tea, coffee, flour, milk, baking powder, canned goods and even dried fruits, are more or less adulterated, many of them with unnatural and poisonous compounds. Candies and sweetmeats for the little ones, are frequently most seriously adulterated with injurious substances. Investigations by various public officers in some of the large eastern cities, and actual analysis by eminent chemists, have revealed many forms of adulteration in the simplest and most common articles in daily use.

It behooves the American people to reject these preparations of unprincipled manufacturers, and as far as practicable to rely upon the substantial and life-giving foods, using questionable articles only when compelled.

It is not always so much in the use of certain articles, as is in the abuse of them, that the body suffers.

Sugar and starch are very important elements in sustaining the human system. Prof. Letheby states in his work on Foods, that "science teaches us that the best proportions for the common wants of the animal system are, about nine of fat, twenty-two of flesh-forming substances, and sixty-nine of starch and sugar."

From this it will be seen that sugar is a natural

food, and the craving for it by the little ones is a natural one. Therefore the use of pure sugar, in proper places and at the proper time, and in proper quantities, may be encouraged, but when it is given excessively, it will not only fail to serve a good purpose, but will create an unnatural desire. It must be remembered that sugar is present in considerable quantity, in nearly all articles of ordinary food, such as milk, bread, potatoes, oatmeal, etc., and that it is not generally required to any great extent in a pure state. (See appendix H.) Like all other food it can be easily abused, and the common practice of feeding it to children in excess, is to be deprecated. When given to appease the appetite, or to stop the crying of a child, it is productive of mischief, but when used moderately, like other food at the table, it is beneficial. Sugar in itself is powerless to act upon the teeth, and not until it has changed to an acid will it affect them. When left in the mouth for a sufficient time, sugar will change to an acid, and as it will settle in those places which are out of reach, it will soon occasion trouble. Therefore as a rule one ought not to indulge in sugar or candies, or sweetmeats after the evening meal, and if used, the mouth before retiring should be effectually cleansed of all foreign matters. In treating the

teeth generally, or constitutionally, great patience and perseverance are required. It is difficult to break up old habits and adopt new ones, but when the teeth are being consumed by destructive agencies, or are being starved by improper food, it is well to undertake a change, since no harm will follow such an attempt.

An inquiry into the various special sources of constitutional trouble will repay all who will investigate.

Changes cannot be effected at once; the structure of the teeth is such that any desired change will necessarily require long and continued attention, and when decay or disease has commenced local treatment must be combined with the general. There is no question, however, concerning the effect of food upon teeth. Teeth can be strengthened by a proper diet, and can be weakened by an improper one.

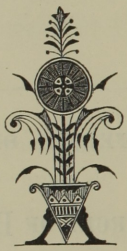
Teeth generally are more or less advanced towards destruction, before treatment is commenced, and it will take time even to check the progress made, and a longer time to regain what has been lost.

The attempt is frequently made, to prepare an cial food which shall act directly upon tooth

structure, but usually all such attempts are useless. There are cases, however, when the use of artificial lime salts can be employed to advantage, but not in the direction or to the extent desired. Certain acid conditions of the saliva or secretions of the mouth can be corrected by washes, etc., but before lime can become useful as a tooth forming, tooth supporting element, it must be present in natural food, or be "organized or vitalized by a living-plant."

EXTERNAL OR LOCAL

SOURCES OF DANGER.



EXTERNAL OR LOCAL SOURCES OF DANGER.

The teeth are liable to be destroyed from agencies, acting upon them from without, and the rule which applied to the degree of danger from internal or constitutional sources, will apply with equal force here.

All teeth are not equally liable to decay.

External sources of dangers comprise all those agencies which act directly upon the teeth or from without, and cause either a loss of tooth structure, or a loss of surrounding structure.

Decay is only one form or source of destruction. Sound and apparently healthy teeth are frequently lost from a misapprehension of this truth. Diseases affecting surrounding structure, (the bones, tissues, flesh, etc.,) are equally important with those affecting tooth structure. Teeth may be affected in one

or both ways, and the result will be the same, viz.: loss of the organs. The inference to be drawn is, that attending to one form of trouble and neglecting another, will not save the teeth. The healthful preservation of teeth demands the removal of every source of danger.

DECAY.

The most common trouble affecting teeth is known as caries, or "decay." The result of decay is a partial or total loss of tooth structure. It is a permanent loss, for nature makes no restoration, or even repair, and when once commenced, decay will continue until arrested by the ingenuity of man, or until the tooth is lost. Decay is the principal source of nearly all other tooth trouble, and causes nearly all the painful experiences so common to teeth.

Pain, however, does not always follow decay; it is possible for a tooth to be wholly consumed by decay without causing painful sensations. It is a frequent occurrence for the dentist to find teeth decayed past saving, without their decayed condition have been detected by the patient.

The progress of decay depends upon the structure and surroundings of the teeth, both in their special and general relation to the physical system.

SEASONS OF DECAY.

Owing to a greater degree of hardness, decay does not advance as rapidly in teeth after reaching maturity. In childhood, during the process of hardening and at the maturing period, teeth are more liable to decay than at other times. So if the teeth can be preserved until *systemic* changes are past and until the teeth have become perfectly hardened, their liability to decay will decrease, and the chances for retaining them will increase.

The process of decay is conceded to be a chemical one, and therefore depends upon a combination of certain elements for its manifestation.

Teeth differ in quality, in powers of resistance and in their surroundings, and decay will differ accordingly. In some it will be slow and unperceived; in others it will seem to devour the teeth at once. In some it will cause pain, in others none. Ordinarily, however, nature will resent the destruction of teeth, and appeal directly to the senses for protection. Any unusual sensation in and about the teeth, therefore, should be taken as nature's warning to protect their structure. Teeth do not destroy themselves without external assistance and there will be found good cause for all decaying teeth. Conditions of health and cleanliness, and intelligent

personal care, cannot arrest the progress of decay, unless it is located in the most favorable place, and continually attended to.

It must be remembered, however, that decay generally commences at some obscure or hidden point, which is unseen and inaccessible to the victim.

Teeth, under the present deteriorating influences of civilization, are unusually subject to decay.

ACIDS.

Decay of teeth is a decomposition of their structure, usually caused by the action of acids.

Acids are substances with a sharp, strong or sour taste, which are destructive in their nature and which are capable of neutralizing an alkali. They are present in living bodies, and in inorganic substances, in the food we eat, and the air we breathe. Some acids, when uncombined are gaseous, others fluid, and others solid. Acids are also formed by combinations of simple articles, and their presence in the mouth is readily accounted for.

SALIVA.

The fluids of the mouth in a normal condition are slightly alkaline, and in order to test the presence of acids it need only to be remembered, that acids will turn blue vegetable color to red. (See appendix N.) A piece of common litmus paper is

easily obtained at drug stores, and will reveal the general condition of the saliva at any time. If the saliva is alkaline, the color of blue litmus paper will remain unchanged after being saturated; if it is acid it will turn to red, or if red litmus paper is used, healthy or normal saliva imparts a blue tint to it.

Acids, however, may be present in the mouth and act promptly upon the teeth, when the saliva is alkaline, or natural in its composition, therefore a test of the saliva, for acids, will only reveal the general condition of the saliva at the time of testing. The presence of acids in the mouth are to be expected, and they will be destructive according to their nature and the time they are allowed to act upon the teeth.

The teeth, as has been already shown, consist principally of lime, and it is well known that nearly all acids act readily upon lime.

If the fluids of the mouth fail to afford protection to tooth structure, and contain a substance which is capable of destroying them, then the great problem of degeneration is accounted for.

That this condition exists in many mouths can be easily proven by the foregoing tests.

But there are other conditions of the saliva, and

other sources of danger. The saliva is secreted in various glands, and discharged into the mouth through various openings. Sometimes, only one of these glands may be secreting and discharging normal saliva, and all the others may be sending out destructive agencies; or the reverse may obtain, and only one, or in other cases none, may be destructive. Thus the saliva itself may be a protector or destroyer, according to its condition, or it may be a protector at certain times, or in certain places, and not at others. The saliva changes its composition according to certain physical conditions, so that a test at one time or place will not suffice for all times or all places.

The cause for this unnatural condition of the saliva is generally constitutional. Certain diseases and derangements of the system are frequently followed by an acid condition of the saliva, each disease producing an acid peculiar to itself. There are no means of discovering this condition or of learning the kind of acid present except by actual test.

SOURCES OF ACIDS.

Acids do not all act alike on the teeth. The degree of destruction depends upon the quality of the tooth and the kind of acid at work.

1st. Thus we find acids are frequently present in the saliva or secretions of the mouth, in both health and disease, and act upon the teeth in a general manner, or whenever they are left undisturbed for a sufficient length of time.

In the saliva are found various acids, even in ordinary health. According to good authority, "The lactic is the most common, but acetic, hydrochloric, oxalic, uric and others, are sometimes found, and that acidity of the saliva is likely to occur in fevers, measles, skin diseases, gout, ague, rheumatism, protracted indigestion, gastric derangements, from immoderate or improper animal food, catarrh, mumps, &c., &c.

2d. Acids frequently enter the mouth and come in contact with the teeth in a direct manner and in full or varying degrees of strength, in tonics, medicines, beverages, condiments, fruits, &c.

Some of the strongest acids known to the pharmacist, and which act promptly upon tooth structure, such as nitric, muriatic and sulphuric, are frequently prescribed by physicians as medicines. Medicines are required, ordinarily, only at those times when the system is weakened and in need of more strength, or when tooth structure, like all other structure, at times of sickness or weakness, requires

extra care and protection to secure it from the effect of a threatening and impending trouble.

Other acids which act readily upon teeth, are contained in articles of common food, such as citric acid in lemons, malic acid in apples, acetic acid in vinegar, and various others in daily use, and which are more or less natural to the use of man. But it must be remembered that weakened and degenerated tooth structure requires protection from even ordinary or natural influences.

Acids also are sometimes sent into the mouth, from sour regurgitations of the stomach.

3d. Acids are frequently formed in the mouth, by chemical changes or combinations of different substances.

These substances may be articles of daily food, and may be actually required by the body for support and nourishment, or they may be articles taken for pleasure or for the gratification of taste, and which are not absolutely necessary to the body, or they may be any articles which are harmless in their natural state, but which become destructive when their nature is changed, or when they are united with some other article to form another substance.

Particles of food or foreign substances, when

forced between teeth or into depressions, and allowed to remain undisturbed, will soon change their nature, and the result will be an acid, capable of destroying tooth structure, and often causing diseases and destruction of surrounding structures. It must be remembered that the mouth is a very extensive laboratory, and contains all the requisites for manufacturing certain chemical compounds. In fact, the secretions of the mouth are in continual demand by nature. The successive influences of heat and cold, and all the varied kinds and conditions of things introduced, render the mouth capable of producing various changes, &c., at any time.

Decomposition, fermentation, putrefaction, and all the various changes to which destructible matters are subject, will certainly occur, and produce acids and destroying agencies, if food is allowed to remain undisturbed in the mouth for a sufficient length of time.

4th. Acids are sometimes formed in the teeth, (after their structure has been once attacked,) by decomposition of their animal structure.

Thus, if decomposition of food, or any other source of trouble has affected any part of a tooth, sufficiently to embrace the living portion, the effect

will generally continue to increase from power developed within itself. A dead or diseased tooth structure, no matter how small or insignificant it may appear, is an incumbrance upon the whole tooth, as much as a small cancer, or other insidious trouble, is to the whole body.

It was stated in another part of the work that teeth do not destroy themselves without an unnatural start, but when started, the elements for complete destruction are all contained within the tooth, and will inevitably manifest themselves.

The enamel covers the opening of the innumerable dentine tubuli, and as soon as the living portion is reached, or becomes diseased, decomposition and destruction will follow in the same manner with the tooth as with other animal structure.

The following, taken from a lecture delivered before the Ohio Medical College, by L. P. Meredith, M. D., D. D. S., of Cincinnati, is so practical and pertinent that it is quoted in closing this subject:

"Knowing how soft the dentine is, compared with the enamel, it is easily understood why decay makes such rapid progress in decomposing its substance and exposing the pulp to the action of irritating agents—punishing the patient for his heedlessness

by giving him the torture of the toothache. We may also comprehend how a small cavity, almost imperceptible, may exist in the firm enamel, and yet the whole of the underlying dentinal substance be destroyed, leaving only a shell of enamel above, ready to crush in when undue pressure comes upon it; just as the inner portion of a nut is often discovered to be entirely eaten up, while a small perforation only, exists in the shell.

But admitting, as we must, that fissures and other imperfections are always present in the enamel, the questions will arise, Why do not the teeth remain just as they are, although the enamel is slightly affected? What is the agent that causes further destruction of the tooth-substance?"

NATURAL HARDNESS OF THE TEETH.

Throwing aside the various theories, some fanciful, some reasonable, of the different auxiliary causes of decayed teeth, it is sufficient for me to state that the main direct cause is acid. We see around us every day instances of how much more powerful chemical action is than mechanical means in destroying the integrity of solid bodies. Take a piece of gold, and you may beat it until it is an impalpable powder beneath the hammer; or you may liquefy it in the intense heat of a furnace; yet you

can not destroy the appearances that indicate that it is gold. Take the same metal and cover it with a fluid that seems as inert as so much water; yet, in a short time, it is completely dissolved, and there is not the least trace of the submerged metal.

So, you may take the teeth and use your sharpest and hardest drill upon them till you despair of being able to enter their substance; you may file or scrape or pound them till you are astonished at their density; or you may subject them to the roughest usage in mastication, cracking nuts, or in biting hard substances, without materially affecting them; yet there is a subtle agent that, working silently, slowly but surely picking out their weak places or their uncleansed surfaces, will soon utterly destroy them.

This acid cause arises from medicines, condiments and beverages; from sour regurgitations from a disordered stomach; from an abnormal condition of the secretions of the mouth; from the decomposition of finely comminuted portions of food, which become packed into fissures or between the teeth, or are suffered to remain in other localities; and, lastly, from the decomposition of the animal matter of the tooth itself. Too familiar to the dentally educated to bear repetition, are the experiments

of Dr. Westcott in this direction; but to those who have paid no attention to the subject, nothing can be more appropriately offered:

SPECIFIC ACTION OF ACIDS.

"Both vegetable and mineral acids act readily upon the bone and the enamel of the teeth.

Salts, whose acids have a stronger affinity for the lime of the tooth than for the basis with which they are combined, are decomposed, the acids acting upon the teeth."

(I would say here, in explanation of Dr. Westcott's statement, that a salt is the union of an acid with a substance called a base, the one neutralizing the other to a greater or less degree—a compound being formed, possessing entirely different properties from those belonging to either of the constituents In some salts the acid is not completely neutralized by the base, in which case they are called acid salts. These are frequently used as medicines.)

"Vegetable substances have no effect upon the teeth till after fermentation takes place; but all such as are capable of acetic fermentation, act readily after this acid is formed.

Acetic and citric acids so corroded the enamel in forty-eight hours that much of it was easily removed by the finger-nail. Acetic acid, or com-

mon vinegar, is not only in use as a condiment, but is formed in the mouth, whenever substances liable to fermentation are suffered to remain about the teeth for any considerable length of time.

Citric acid, or lemon juice, though less frequently brought into contact with the teeth, acts upon them still more readily.

Malic acid, or the acid of apples, in its concentrated state, also acts promptly upon the teeth.

Muriatic, sulphuric, and nitric acids, though largely diluted, soon decompose the teeth. These are in common use as tonics.

Sulphuric and nitric ethers have a similarly deleterious effect, as also spirits of nitre. These are common diffusible stimulants in sickness.

Super-tartrate of potash (cream of tartar) destroyed the enamel very readily. This article is frequently used to form an acidulated beverage.

Raisins so corroded the enamel in twenty-four hours that it presented the appearance and was of the consistency of chalk.

Sugar had no effect till after acetous acid was formed; but then the effect was the same as from this acid when directly applied."

In spite of these honestly detailed and convincing experiments, there is no doubt that if the teeth of

the present day were as hard and sound as those of our forefathers, they would seldom be destroyed by the acids usually brought in contact with them in the course of an ordinary life-time. But having teeth of less durable material, with specially exposed points here and there, we must admit the capability of acid to destroy them if we are not energetic in adopting means of prevention.

When we consider that many people do not clean their teeth at all; that most people only attempt to clean them once a day, in the morning, allowing the food of three meals to remain all day and all night impacted between and around them to form a destructive acid; that others, who do profess to cleanse them, do as much harm as good by their method; that no alkaline compound is taken to neutralize acidity, can we wonder that decay of the teeth is such a prevalent disease?

TO NEUTRALIZE THE EFFECT OF ACIDS.

Acid medicines should be taken through a tube. Immediately after taking acids, the mouth should be thoroughly rinsed with an alkali or some alkaline preparation which will neutralize the acid. It is not enough that acids be simply diluted; they must be removed or destroyed.

The frequent and thorough use of ordinary lime

water or a mixture of bi-carbonate of soda and water, is all that is generally required for neutralizing acids in the mouth.

RESULTS OF DECAY.

Nearly all pain in and around teeth is primarily caused by decay. Decay is the primary source of abscesses, "gum boils," many neuralgic pains throughout the head, and other similar troubles. Simple toothache is only a small part of the trouble caused by decay.

Usually as soon as decay has reached the dentine, it begins to manifest itself whenever hot, cold, sweet or sour substances are brought into contact with it. The nearer the decay approaches the pulp of the tooth the more sudden will be the pain. Often, however, the conditions are such that decay will act as a non-conductor, and its presence will not be discovered by unusual sensations, or by pain from thermal changes, &c.

Decay, if left undisturbed, will destroy all parts of the teeth, and after the pulp is lost, abscess will usually result, the poisonous discharges from which will be more or less absorbed back into the physical system, and produce serious complications.

MISCELLANEOUS AFFECTIONS.

There are other and varied forms of trouble, and

abnormal conditions which affect the structure of the teeth, but which it will be unnecessary to notice at any length, since they are uncommon, or not easily comprehended, and can only be understood by careful study and continued observation.

Thus, there are affections of the teeth known as "Atrophy" or "Denudation," a peculiar pitted or marked condition of their structure caused by defective nourishment at the time of formation, frequently resulting from attacks of scarlet fever, measles, chicken pox, small pox, &c. "Exostosis" is an abnormal growth of bone upon the roots and is an occasional cause of neuralgia. It is produced from various causes, but generally from ill usage or overwork. "Mechanical Abrasion," is a wearing away of the cutting or grinding surfaces from long service, is generally confined to the front teeth, which then strike unnaturally end to end. "Pulp Nodules," is a detached bone or bone-like formation, in the body of the pulp, caused by some derangement or eccentricity and generally producing pain in the teeth. "Necrosis," is death of the living portion of a tooth, while the tooth is sound, and the surrounding structure healthy, which may occur from various sources at any time, as from a blow, a fall, a shock, or anything which

overworks them or is capable of strangulation, or inflammation of the pulp, or from any chemical action or mechanical injury. Biting threads, pins, needles, cracking nuts, pulling, lifting, &c., with the teeth, or any unusual or unnatural use of them, can occasion this trouble.

DISEASE OF STRUCTURE SURROUNDING THE TEETH.

After decay, the next most serious trouble which affects the permanency of teeth, is an affection of the structure surrounding the teeth, such as inflammation or disease of the gums and tissues, and disease and destruction of the Alveolar process or tooth sockets.

The gums in a healthy condition should present a pale, pink appearance; their edges should be thin and firm, and closely embrace the necks of the teeth, thus preventing the accumulation of substances under them, or between them and the teeth; they should withstand all natural uses and cleansing processes without pain, bleeding or injury.

The Alveolar process is a loose or sponge-like formation of bone upon the jaws, in which the roots of the teeth are firmly imbedded, and which in a natural condition should come to the edge of the necks of the teeth, and be covered by the thin gums. (See cut on frontispiece.)

The health and integrity of these structures are all-important to the preservation of the teeth.

An inflamed or diseased condition of these structures, is generally caused by improper or insufficient attention to cleanliness, and is therefore more easily prevented than decay; but after it has once made any serious advance, its progress cannot generally be controlled by ordinary or even professional means. Such a condition is therefore more dangerous in one sense, than decay.

SOURCES OF EXTERNAL TROUBLES.

The common sources of the above troubles are accumulations of foreign substances upon or around the teeth, and upon or under the gums. The same troubles may also arise from decaying teeth; improper methods of caring for the teeth; poorly or imperfectly performed dental operations; poorly fitting artificial teeth; tobacco, &c., &c. It may be well to remark right here, that while tobacco may not have any injurious effect upon the structure of the teeth, it does have in nearly all cases when its use is not carefully guarded, a very decided and destructive effect upon the structure surrounding the teeth. This distinction is commended to the intelligent consumer or user of tobacco.

The greater the accumulation of foreign sub-

stances, the greater the danger, and as soon as it commences the danger commences.

At first the effect is a simple irritation, so slow that it is not perceived until an inflammation occurs.

The result of inflammation in any part of the body is nearly the same, and unless measures are adopted to relieve it, the structure must suffer, until congestion or death ensues.

Accumulations of food upon and between the teeth, are irritating substances; so also are improper and gritty tooth powders, harsh brushes, &c., &c.

The most general source of these troubles, however, comes from tartar, a substance which is deposited in the mouth, and which adheres with more or less tenacity to the teeth, wherever it can find undisturbed lodgment. It is more generally found in places nearer the ducts where the fluids are discharged into the mouth, upon the outer surfaces of the upper Molars, and the inner surfaces of the lower teeth.

The lower front teeth are seldom affected by decay; they are, however, unusually subject to loss from these accumulations.

The following, from Dr. White's popular book

upon "The Teeth," will fully describe the nature and effect of Salivary Calculus or "Tartar," and close our considerations of diseases affecting teeth: (See appendix M.)

"The deposit called tartar, which collects more or less about the teeth of all persons, differs very much in appearance, quantity and character. In different individuals it is black, brown, green, yellow; or nearly white. Its presence is more or less hurtful according to its character and quantity. In some cases its influence is exceedingly pernicious, causing the gums to become swollen, inflamed, and spongy, suppuration occurring about their margins, followed by their recession from the necks of the teeth, and absorption or waste of the sockets. The gums become so sensitive that the use of a tooth-brush is exceedingly painful, and on this account there is no effort made to keep the mouth clean. The tartar accumulates rapidly, and the result is the destruction more or less speedily of the alveolar processes and the loosening of the teeth until they drop out.

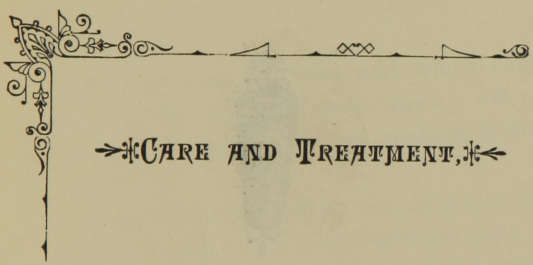
These, however, are not the only results. The breath becomes fetid; the secretions of the mouth are vitiated; indigestion, loss of appetite, affections

of the eyes, pains in the ears, headache, neuralgias, and general derangement of the health follow.

That derangements of the digestive functions and consequent impairment of the whole economy may result from a diseased condition of the mouth, is too well established to require an argument. The presence of decayed teeth and roots, ulcerated or suppurating gums, accumulations of tartar, etc.. must necessarily vitiate the secretions of the mouth, and cause irritation more or less severe of the mucous membranes of the stomach. The exhalations from a mouth so diseased, may, and no doubt often do, produce an injurious effect upon the bronchial tubes and lungs, and may even be the exciting cause of consumption.

These being facts, it is wonderful that so many otherwise intelligent people neglect the teeth of their children; allowing them to grow up without having acquired the habit of keeping the mouth scrupulously clean; paying no attention to the condition of the teeth until an exposed nerve speaks with a voice that will not be silenced, announcing the mischief which has been allowed to proceed unchecked. Still more wonderful is it, that so many fail to appreciate the importance of taking care of their own teeth, until decay, diseased gums,

and consequent suffering, impel them. Then, when the demand has become imperative, their chief thought seems to be, not how best to prevent further mischief, and retain what is left of their dental organs in as perfect a condition as may be, but how cheaply immediate palliation of their trouble can be secured; and, as though there were no degrees in skill, or difference in value of materials, making no account of the time required for a faithful performance; they think only of the cost, and congratulate themselves when they succeed in finding a *cheap* dentist. This is the worst possible economy. Skill and experience are the results of time and labor, and should command a remuneration equivalent to their worth."



CARE AND TREATMENT.

CARE AND TREATMENT.

After everything has been told which can be concerning the teeth, the main inquiry will continue to be, in regard to the best methods of caring for them.

Thus far this little work has not given special directions or advice concerning personal care, and professional treatment, but has confined itself to general information and advice, from which the reader could gather intimations of the treatment required in individual cases. The demand for more specific and practical information is daily increasing, and while it will be impossible to give rules which will apply to all cases, yet there are certain dental conditions which admit of specified forms of treatment.

Thus the disease known as " decay " must be met

by treatment which will arrest its progress, and a lack of attention to the surroundings of the teeth, must be met by personal care, cleanliness, diet, &c. Individual care and professional treatment are necessary to the perfect preservation of teeth ; one cannot succeed without the other.

TO PARENTS.

The fundamental consideration in securing good teeth, relates to their formation, structure and nourishment. The first requisite, is a healthfully inclined and sound parentage. The first treatment required is antecedent, constitutional, preventive.

Whenever poor tooth structure, or an imperfect physical organization, exists in either parent, a similar condition may be expected in those who receive their being from the parent, and generally in an increased proportion ; for the tendency of teeth at the present time is toward destruction, and with impaired or disturbed functions, the tendency is hastened.

Good or poor teeth are readily inherited.

The writer was permitted, in the fall of 1878, to visit a tribe of Indians, upon their government reservation in the northwestern part of Wisconsin, and he took occasion to inspect their teeth. This tribe are living in a semi-civilized manner, and

apart from all other people. The old chiefs and their families usually prefer the primitive mode of life; but the half or mixed breeds have considerable ambition to be considered enlightened.

Nearly two centuries previous, this tribe were more or less mingled with the French and British troops, quartered in their vicinity. These full blooded descendants of the proud "red men of the forest" in their original or ancient grandeur, and "their cousins, and their uncles and their aunts," the half-breeds or descendants of a mixed blood, are living side by side, and often in the same wigwam.

The teeth of the full bloods were invariably good, and those of the others invariably bad; in fact, the contrast was remarkable, and illustrates the truth, that in addition to forms and habits of life, there must be a hereditary tendency to secure good teeth.

The causes of the degeneration in this case were easily traced to insidious diseases of nearly two centuries previous.

Inheritance is a primary source of trouble with the teeth, and it is common to find the peculiar form or position of a certain tooth transmitted through several generations, and therefore it is not

surprising that decay is transmitted in the same manner.

TO MOTHERS.

The first care must precede the birth of the child. The exhausting effects of maternity are too well known to require special consideration, but as the first inclination to trouble with the teeth frequently arises there, it is well to keep it in mind.

It is an old but suggestive saying, "every child has cost me a tooth," for the result of child-bearing is usually a loss of one or more teeth before the period of lactation is over. The saying might, however, with propriety be changed: "Every child has cost me almost a whole set of teeth."

Mothers should care for their teeth in time, for after a certain time the condition of the mother makes it unwise to have the teeth either filled or extracted.

The continued daily use of purified middlings added to flour, in the different forms of bread is especially recommended for a bone-producing element, and the frequent use of chalk as a dentifrice, or lime water as a wash, is recommended for an external corrective. The following advice by Dr. Chase, of St. Louis, is especially interesting to mothers:

"As the bones of the body are composed of similar materials to the teeth, it is important to remember that there is a great call for phosphate of lime to harden the bones as well as the teeth of the child before birth. But as the teeth must be better calcified than the bones in early life, it is important that the blood of the mother should be rich in the materials needed. This cannot take place without good health, without proper food, or without a digestion which shall convert the food perfectly into blood.

Sickness of the expectant mother will often dwarf the teeth of her child. There are often seen furrows across the teeth, and little pits in the enamel, making them look like fine honey-comb. These furrows are caused by a cessation of growth, produced either by severe sickness of the mother, or by indigestion, which fails to convert good food into good blood, or else by not providing for the stomach such food as the blood requires.

It is necessary for a person to eat a definite number of ounces of food each day to keep the body in health and from decreasing in weight. It is very evident that an additional amount is necessary when a mother has a growing child to provide for.

And thus it behooves mothers at this time to pay particular regard to their health. All those common-sense measures for promoting and securing it should be used at this period, even if neglected at other times; for there is a moral responsibility resting upon every mother to give her child as good, sound and healthy a constitution as possible, as well as the individual organs of the body. Exercise in the open air; warm and loose clothing; plenty of sunlight; frequent comfortable baths; plain and substantial food; plenty of sleep (seven or eight hours;) avoid stimulants, narcotics, and "patent medicines." Black, Japan, or English breakfast tea is more wholesome than coffee. Pork, smoked fish, starch and fine flour should be very sparingly used, if eaten at all."

"A mother weighing about 140 pounds, who nurses her child, must supply her own bones and teeth, and those of her child with about 87 grains of phosphate of lime daily. Sixty grains of this would be to supply waste, the other 27 grains would build up the bones and teeth of her child. A great deal of the lassitude and bad feelings of women is owing to defective nutrition. Phosphoric acid is very necessary to the nervous system. The brain needs a large quantity of it daily. The ope-

rations of the mind demand it, and so do the muscles in their work. The mind is feeble, and the whole system languishes when phosphoric acid is wanting. We have seen that there is fifteen times less in superfine flour than there is in Graham flour.

If mothers wish that the teeth of their children should grow to perfection, and be as hard as nature destined them, they will do well to heed the facts here presented. The same facts will apply to the food of children, and even to adults. I have seen soft teeth become hard by a better diet. I have seen good hard teeth soften by a poor diet."

GENERAL OR INDIVIDUAL CARE.

The personal care required in the preservation of ones own teeth, includes:

1. Proper nourishment.
2. Healthful exercise.
3. Cleanliness.
4. Frequent professional advice, and necessary treatment.

Under the most unfavorable conditions many teeth are improved by attention to these four requirements.

Food has been fully considered in other parts of the work, to which the reader is referred for details. If the teeth are continually deteriorating, and

if a suspicion exists that the food taken has any part in their destruction, then consult practical authorities in regard to a change of diet, and at least try the chances of a change. If the chief articles of food have been fat of meat, white flour, corn meal, buckwheat, pastry, or any similar articles, let them be replaced by a more nutritive, or better bone-supporting element, such as patent purified middlings flour, milk, eggs, lean of meat, potatoes, (baked or roasted are the best,) ripe fruits, &c., &c., only remembering a change will necessarily require time and perseverance thoroughly to test it.

EXERCISE.

The natural use of teeth is calculated to assist in preserving them.

All the teeth should be equally exercised, and if anything interferes with the free use of any tooth, the interference should be corrected at once, if possible. There are cases, however, after a tooth has been allowed to pass out of natural conditions into one of disease, or into artificial methods of preservation, when a free use of it is nearly impossible, owing to its liability to shock, or to painful impressions from thermal changes, acids, &c.; but ordinarily heat, cold, sweet, sour, and the common

use of teeth ought to be unattended by any noticeable or painful sensation. Perfect condition can, of course, only be maintained by the perfect preservation of the integrity of the teeth, and of the surrounding structure, Certain acid conditions of the mouth, also, produce sensitiveness of the teeth, which sometimes prevents a free use of them, but such conditions are generally local and controllable.

No favoritism is permissible. The habit of chewing upon one side, or in one place, to the exclusion of the other side or other places, is generally more injurious to the unused teeth, than to those used. Judicious exercise or natural use is to be encouraged, but unnatural uses of teeth are to be most carefully avoided. Therefore biting hard substances which require unusual force, such as thread, nuts, hard candies, pulling needles, &c., &c., lifting, wrenching, grating, snapping, &c., and other exhibitions of prowess, are not only injurious to the teeth, but may cause other troubles in other parts of the face; and if the teeth are under professional care, such practices will generally ruin the most perfect treatment by displacing the material which was inserted to preserve them, or by fracturing the thin edge of

enamel upon which the work depends for permanency.

The effect of acids upon tooth structure has been already shown, and it only requires a microscopical opening through the enamel for acids to reach the dentine and endanger the whole tooth.

Mechanical injuries may result from various accidental sources, and they are sufficiently numerous, such as sudden falls and blows, biting hard substances in food, &c., without increasing them by carelessness.

The result of these injuries is fracture of the enamel, minute openings to the dentine, disease, decay, &c.

Unnatural exercise should never be indulged in, even by those possessing the strongest teeth.

CLEANLINESS.

Under modern or artificial modes of life, the teeth are not sufficiently exercised, or naturally cared for. Both personal and professional care are a positive necessity in nearly every case, and only by continued and persevering attention, can the teeth be kept in a healthful, presentable condition. In order to surround the teeth with preservative influences, the sources of trouble must be removed,

and means employed to change injurious tendencies.

It has been stated elsewhere in the work, that all teeth are not equally liable to decay, and therefore the care and treatment required must, in a certain sense, correspond with the kind and degree of trouble.

The general facts above stated, must be accepted as concerning all teeth, and no one can be excepted on account of apparent perfection. When so much of health and happiness depends upon the teeth, it would seem that they are entitled to attention which is equal to or greater than that bestowed upon the external cleanliness or appearance of other parts of the person.

BRUSHING, ETC.

Personal care, or external treatment, should be commenced as soon as one is old enough to be taught, and should continue unremittingly through life.

The first requisite is a suitable brush—one adapted to the form and position of the teeth, the texture of the gums, and the age of person, To secure this, the family dentist should be consulted, and from him should be learned the common lodging places of food and other accumulations, and the

manner of using a brush to advantage, and how to accomplish the process successfully.

The ordinary method of brushing teeth is injurious rather than beneficial. It must be remembered that the faces of the teeth, where the brush is most generally used, are kept more or less free from foreign substances by the action of the lips, cheek, tongue, fluids, exercise, &c., and the points requiring most attention are in the depressions, and between teeth where it is impossible to dislodge substances by ordinary means. Decay and diseases are generally situated between the teeth, at the margin of the gums, or in places favorable to the lodgment of foreign substances, &c., and which are out of reach of the brush. The frequent use of a suitable brush is an imperative necessity in properly caring for the teeth, and when one form of brush does not perform the service satisfactorily, then different forms, sizes, &c., should be used. Passing the brush back and forth across teeth, only cleanses their protruding surfaces, (which seldom decay,) and forces the accumulations, mucus, &c., into the spaces which require greatest protection.

Therefore a brush should be selected according to the needs of the individual, and possess certain qualities which will render it of practical use. The

dentist, not the dealer, is the one best qualified to judge concerning it.

It should be used in such manner that it will not injure the gums, or produce pain, and the bristles should be forced into all depressions and crevices, until all substances which can be reached are dislodged.

Passing the brush up and down, backward and forward, inside, outside, and over the ends of the teeth and in every conceivable direction, is especially recommended.

A finely pointed quill tooth-pick is a necessary accompaniment to the brush, and should be used both before and after brushing. Metal tooth-picks and coarse wooden ones fail to subserve the purpose, and in fact one cannot depend upon any of the accessories, for a complete and perfect removal of accumulations. Dental floss silk is an important aid, and may frequently be used in places where nothing else can. It should be drawn between the teeth once a day, especially at night. If the teeth are perfect, and free from accumulations, the thread should pass without tearing, and if it fails to pass, or is torn, trouble may be suspected, and the dentist should be consulted at once.

The longer accumulations rest undisturbed, the

greater will be the trouble; therefore the brush and tooth-pick should be used freely immediately after each meal.

As the destructive process will progress faster when undisturbed, or when the acids are less diluted, it follows that the night time, or hours of repose, are the most favorable to decay.

During sleep the muscles, tongue and fluids are comparatively quiet and destructive agencies are less interrupted than at any other time; therefore before retiring, the mouth should be placed in the most favorable condition and the teeth be most effectually cleansed of all accumulations.

All the brushing one can give the teeth will never injure them.

After using the brush, toothpicks, &c., water of an agreeable temperature should be forced swiftly through between the teeth, thus removing the particles dislodged.

If pure water will cleanse the teeth it is all that is required, but the occasional use of suitable dentifrices will promote their health, and in a softened or diseased condition of the teeth or gums a suitable wash will be of service.

POWDERS, WASHES, ETC.

In personally caring for the teeth, it must be re-

membered that while their structure will permit the free use of healthful appliances and accessories, it will not admit of substances which act upon them chemically or affect them mechanically, or irritate the surrounding structure.

Dentifrices, soaps, powders, washes, &c., should be used with the greatest caution, and only under direction of the dentist.

Chalk in some agreeable form is the only article which can be recommended for general use, and to this may be added other harmless ingredients to meet the requirements of individual cases, tastes, &c., but under no consideration should such insoluble substances as pulverized charcoal, pumice stone, marble dust, &c., &c., be indulged in, even temporarily, for these substances are highly injurious to the delicate tissues surrounding the teeth. A formula for a harmless dentifrice is given in the appendix. (See appendix O.)

Mouth washes are only intended for removing or correcting diseases, and therefore ought not to be used under any circumstances without the advice of the dentist who has the teeth in charge. Any wash or liquid application which will suddenly remove stains, or produce whiteness, must be composed of substances capable of acting chemically

upon the teeth, and is therefore of the same nature of the acid or material which produced the trouble.

Lime water and a solution of common soda are the only washes permissible without the sanction of the dental adviser. Chalk or lime water can be used freely without injury, and they are recommended in all cases where the teeth are over sensitive, or unduly tending to destruction, or in acid conditions of the mouth. (See appendix P.)

Their use is better at night before retiring.

The most attentive personal care, however intelligently and persistently it may be exercised, will fail to preserve the teeth or eradicate trouble, after decay or disease has once affected them; therefore one of the most important steps toward preserving teeth is to place them under professional care as soon as they have erupted, before decay has begun.

The sources of decay are so common, and the places of attack are so peculiarly located that personal observation can not be relied upon. The use of mirrors, and peculiarly constructed instruments, a practiced eye and a delicate sense of touch are often required to detect unnatural conditions, to say nothing of the treatment required.

As teeth demand constant attention even during perfect physical health, there must be an increase

of protecting influences, when the system is suffering from any form of disease or injury. Therefore, during sickness lime water or some alkaline wash should be freely used, and upon recovery, the teeth should be immediately entrusted to the care of a dentist.

TREATMENT.

If all persons could see alike, there would be but little variation in dental operations; but as there are various and widely separated methods, it will only be possible to enumerate some of the more important modes of treatment.

The object of professional treatment is to preserve the teeth and their surrounding structure, from disease and decay. The preservation of natural teeth after destructive processes have commenced, is an exceedingly delicate operation, the successful accomplishment of which will require a high degree of skill, a thorough knowledge of the parts involved and the intelligent application of every truth connected with the undertaking.

Dentistry has more incompetent and unscrupulous practitioners according to the number engaged than any other profession; therefore it is not surprising to find many persons who have been imposed upon, or who have lost faith in it.

The selection of a dental adviser should be attended with the most considerate regard for the future welfare of the teeth.

Permanent improvement is desirable, in preference to simple temporary service. The teeth are to be surrounded by the same or similar influences through life, and what produces trouble at one time, will continue to produce it, so long as the conditions remain the same; therefore all treatment must be based upon this expectation.

Whatever is done for the teeth professionally, should be thorough and adapted to the condition of the teeth and the patient.

Much valuable service can be rendered, by the intelligent application of simple measures, but this must not be interpreted to mean that simple measures consist of imperfect, or ill performed services.

"PREVENTION IS BETTER THAN CURE."

Proper treatment consists of those measures which will restore health, comfort and usefulness, and prevent the formation or recurrence of trouble.

As decay is the principal source of troubles with the teeth, preventive treatment must therefore consist of those measures which will tend to prevent the causes of decay from accumulating.

The primary elements of decay are contained in

substances in the mouth, and which find lodging places upon the roughened or more favorable surfaces of the teeth.

It has been stated elsewhere that if teeth could be kept scrupulously clean, at all times, they would seldom decay. Therefore those conditions which favor the retention and accumulation of food, fluids, or foreign matter upon the teeth are calculated to disturb and destroy their structure. Thus pits, fissures, depressions and intermediate spaces are favorable to the lodgement of foreign substances, and are generally beyond the reach of personal care.

In primitive modes of life these pits and fissures are not so common as they are in artificial life, for the teeth are worn smooth upon their grinding surface, and better material and a more natural form of food protect their sides and approximate surfaces.

If we would imitate nature, we must employ those agencies which will to some extent take the place of natural protectors. The first treatment, therefore, tending toward the prevention of trouble, must be the establishment of free access to every part of every tooth, and the destruction of all lodging places which cannot be kept under immediate and continual surveillance. Thus the employ-

ment of suitable instruments, under the intelligent management of a dentist, who is capable of so disposing the teeth that they will not easily decay, is one of the first duties toward their healthful preservation.

Human nature, however, is more or less distrustful, and preventive treatment is seldom successfully accomplished, owing to various prejudices, etc.

The use of the file, burs, disks, chisels, tapes charged with powders, and various other implements, are first means, which require an intelligent application, and a reasonable appreciation to make them of permanent service.

All that is sometimes required is a very simple operation, and if performed in time, it will not only prevent trouble, but will save the expenditure of money, pain and time upon more elaborate work.

Dr. Arthur, of Baltimore, has presented to the world his system of "Preventing the Decay of the Teeth," which he claims has been highly successful in his own extensive practice. He asserts in his work, that all teeth, with rare exceptions, may be preserved, decay prevented, unusual pain avoided, and expense diminished by his methods of separating, filing, &c.

That he has succeeded in a great measure, is

beyond question, for his patients are living examples, and have been under examination for years; but the fact that all persons are not disposed to submit to these special forms of treatment, will delay the millennium, and continue the old practices.

A few selections from his recent work on "Prevention of Decay," are worthy of perusal and careful thought by dentists aud patients:

"If, by any means, the teeth as they are developed, could be managed so as when fully formed to stand separated from each other, decay of the proximate surfaces would be rare. As there are no means at present known to dentists, of managing the development of the teeth so that they can be made to stand in open order; the question naturally comes up, as to whether such separations may not be made artificially after the teeth are fully formed.

This indeed, can be, and has been done for many years. One of the operations relied upon by the older dentists for the arrest of slight decay, was that of filing the teeth, so as to make permanent separations.

There is but little question that under favorable circumstances, decay would always be arrested in this way."

He then goes on to illustrate this practice, with cases in hand, many of them having been filed more than half a century previous, and in such a manner that some of them were nearly one-third filed away, and the teeth as good as the day they were operated upon.

Dr. Meredith, also, in the lecture previously quoted from, says:

"Filing is a very necessary and safe dental operation for the purpose of separating closely crowded teeth, for removing superficial decay, for shortening elongated teeth, and occasionally, for the correction of irregularity; yet there is, probably, no operation against which there is so much prejudice. Most people consent to it reluctantly, and many will not submit to it all. The common belief is, that where the enamel is filed, decay is certain to result. But many instances are met with where shallow decay has existed in similar positions on opposite sides of the mouth; on one side it has been removed by the file, while on the opposite side the operation has been neglected; and the result has been that the filed teeth have been preserved without recurrence of the disease, while the neglected ones have, in a few years, been destroyed by decay.

Many savage and barbarous nations, in order to rend their food better, as well as to make themselves 'beautiful in peace and terrific in war,' file their front teeth to sharp points. It is well known that the teeth that are thus filed are seldom affected by decay, owing to the fact that they are kept constantly clean by the movements of the tongue and by the passage of liquids. American dentists have partly imitated this custom, by cutting V-shaped spaces at the back part of the upper front teeth. They are not seen from the front, and decay is prevented, because they are kept constantly clean by the point of the tongue."

The main object of occupying so much space concerning the prevention of trouble, is to impress the importance of early attention, and disabuse the popular mind of the errors so common, concerning separation, filing, removing superficial decay, scraping, polishing, scaling, &c. The treatment of many of the more complicated cases of decay by filling, depends for much of its success upon the observance of the principles and practices above referred to. All large or extended cavities of decay require more or less cutting, and cutting is filing, and filing is cutting, so that the methods advocated

are more or less resorted to even in the operation of filling.

Permanent separation is only advocated in those cases which demand such treatment, and should only be entrusted to those persons who will have the highest regard for the welfare of the patient.

Sometimes the extraction of a tooth is required to make room for the remaining teeth, and by judicious management this method can be made serviceable in certain cases, for securing proper space, &c. It must be remembered that crowded or irregular teeth require early attention, and the removal of teeth to secure permanent separation, must also be attended to in season, or simply extracting a tooth may be a source of greater danger to the remaining teeth, from loss of antagonizing or approximating support.

Prevention of troubles with the teeth ought to be the great study of the dentist, and in the good time coming, it is hoped that the people will pay more regard to this branch of the profession, and thus avoid the more severe, trying, and less enduring service.

FILLING.

After decay has so far advanced as to demand more radical treatment than simple measures, then

the tooth must be treated by artificial means. The decayed portion must not only be removed but it must be replaced by some material which is calculated to arrest the further progress of decay in that particular spot.

The English or European term of filling, is "stopping" or "stopped," and it better expresses the intention ; for any one, after a little practice, can fill a decayed place in a tooth, but only a few, comparatively, can stop the progress of decay.

The conditions of decayed teeth are so peculiar and often so complicated, that practical information about meeting the requirements of special or individual cases would be impracticable in a work of this kind.

Decay is to be treated as a disease, and only by an intelligent application of remedies can it be arrested. It should be corrected as soon as it commences, and not be allowed to penetrate the tooth until pain results. Removing decayed particles of tooth structure from a living, sensitive tooth, is an exceedingly delicate operation, and it is no wonder that so many failures occur, when it is productive of so much pain, and requires so much patience as is frequently demanded in deep-seated, or highly sensitive cases.

Before introducing the filling material, it is generally necessary to remove every particle of decayed matter, if permanent operations are desired. If from neglect, carelessness, haste or any other cause, any particles of decay are not removed, and the filling material is placed over the decay or even beside it, the process of destruction is only temporarily arrested, and in the course of time it will manifest itself with greater force than ever.

The first requisite for a serviceable filling, therefore, is a reliable foundation. The decay must all be removed, and the cavity properly formed, to permanently retain the protecting material.

MATERIALS USED IN FILLING.

The materials employed to replace the diseased and removed portions and to protect the freshly exposed parts, are different metals, minerals, &c.

Sometimes metals are used purely and singly, such as gold and tin, and sometimes they are combined to form alloy, amalgam, &c. Minerals are generally used in combination, and are also employed in the gutta percha compounds. The profession are somewhat divided regarding the materials best suited to the preservation of the teeth.

One great source of failure in dental operations, is the inability or indiscretion of operators in select-

ing the right material for individual cases. Thus pure gold, which has been considered the most satisfactory, and which has preserved teeth for a lifetime, is often a failure, and what is said of the failure of gold will also apply to all other materials in use.

Gold is the KING of metals, but it requires skill, experience, and a large degree of patience, to work it successfully. The expense and the labor of working it, are greater than for any other material. Therefore gold should only be employed when the conditions are favorable, and where expense is a secondary consideration.

The alloys of gold, platina, silver, tin, &c., are used, and more often abused. The denouncement of amalgams, by a large class of intelligent practitioners, who do not employ them at all, is sufficient reason for mistrusting their preservative qualities or good influences, but their advocacy and employment by men of unquestioned honor and intelligence is also a good ground for believing some good of them.

There is probably a medium ground between the two, where the conservative practitioner can profit from the lessons taught by each, and apply his ob-

servations for the benefit of his patient, even in the use of alloys.

Amalgam fillings have preserved teeth for a lifetime, and they have failed to render a moment's good.

The following, taken from a recent article upon "The New Dental Departure," will be read with interest by those desiring further information regarding materials:

"We are certainly on the eve of a radical change in the methods adopted for conservative dentistry; but because the so-thought catholicon for dental decay, gold, has not fulfilled the requirements in all cases, we should not rush precipitately to the employment of a material that, even were it free from the highly objectionable features and injurious effects enumerated, still would answer only a temporary purpose for the arrestation of decay. Although in our rapid strides toward dental perfection, we have been disappointed of some of our expectations, we should yield only that ground which is proved to be untenable, while we firmly establish ourselves in positions that we know can be maintained.

Experimentation and invention have striven to produce a material for filling that is capable of

ready adaptation to every portion of the walls of a cavity; free from contraction; a non-conductor of thermal changes; of natural color; uninjurious to the teeth, mouth or system; hard enough to prevent undue attrition from mastication, and insusceptible to the action of medical or chemical agents that may at any time be present in the mouth. Any substance possessing these qualities and attributes would be considered perfection. Various ones have been presented and thoroughly tried, but most have been found wanting in some respects.

Long and thorough experience with them has educed the following incontrovertible, incontestible facts relating to the efficiency of different filling materials. All of the assertions are based upon the supposition that the work is done by skillful, conscientious operators; where others are employed beneficial results cannot be regarded as certain in the use of any material. Ordinary attention is expected from the patient also; where people are utterly negligent in regard to cleansing their teeth, it may be considered as certain that decomposing food and vitiated secretions will undermine the best fillings in the course of time.

Gold will permanently preserve the teeth when

placed in simple cavities with strong, thick walls of enamel, the dentine not having been exposed so long as to be decomposed to a considerable depth. Between the approximating surfaces of teeth sufficient space must be left for the patient to keep the fillings clean. Gold fillings in cavities of the most extensive and complicated nature will often save the teeth permanently, with ordinary carefulness in cleansing by the patient, if the filling or the surrounding tooth substance does not become broken by use; but on the other hand, they will very frequently fail in a few years, owing doubtless, to the unhealthy condition of the dentine, caused by long exposure before filling. Frequently, where such large fillings are inserted, the frail edges of the tooth or a portion of the gold will be broken off in mastication or by mechanical violence, an exposed place being thus formed for the lodgment of food and the fluids of the mouth, which renew decay. Often in such instances the breach cannot be repaired without the re-insertion of the entire filling. Gold being one of the best conductors of heat and cold, very often unpleasant sensations are felt in the tooth for a while after filling, when hot or cold substances are taken into the mouth. Occasionally, from this cause, inflammation and death of

the pulp of the tooth, with subsequent discoloration and abscess, occur ; but trouble of this kind is so infrequent that it can scarcely be urged as one of the objections against gold. The color of gold, though very unnatural, seldom causes dissatisfaction. As far as complete adaptation to the walls of the cavity, freedom from shrinkage, purity, innocuousness, unchangeableness, and resistance of mechanical and chemical action are concerned, gold is absolute perfection, While its expensiveness in small cavities is not so great as to deter any one from having it who can afford dental services at all, yet in large, compound ones it often presents an insuperable barrier to its use. There is no way of overcoming this difficulty without slighting the operations. A filling requiring from several hours to an entire day's time must necessarily be costly.

Tin Foil answers most of the requirements, and is nearly as good as gold in simple cavities. In large contour fillings it cannot be used to advantage on account of its lack of cohesive or welding properties. It has one advantage over gold in its being a poorer conductor of thermal changes. In many cases it becomes discolored, and partially disintegrates after some years' use. There is little difference between its cost and that of gold,

owing to the fact that it requires fully as much time and care for its insertion.

Gutta Percha compounds are excellent as temporary fillings, and sometimes last for years when not exposed to masticatory action. Hill's stopping may be taken as a representative of this class; it is entirely free from conducting properties; it is readily pressed into the cavity and built up to the form of the tooth by warmed instruments, becoming tolerably hard and tough as it cools. A large filling may be inserted at a trifling cost, in a few minutes, that would take many hours with gold.

White filling is the common name of a polynomial compound known by the various appellations, osteo-plastic, osteo-dentine, os-artificial, bone-filling, Guillois's cement, German cement, cement plombe, etc. They consist essentially of oxide of zinc, chloride of zinc, silex, borax, and coloring matters. Osteo-plastic may be taken as a type of all; it is coming more and more into favor every day; and it may be predicted, as it is ardently to be hoped, that the time will soon come when it will supersede everything else for filling in those complicated cases where gold filling has proved to be so expensive, tedious and uncertain. It meets the list of requirements of a perfect material for filling

the teeth more nearly than any substance known. A shade can be selected that approximates very closely that of the natural tooth. It is a non-conductor of thermal changes; it is pure and uninjurious to the teeth, mouth and system; it allays sensitiveness of the dentine, which frequently requires especial medication in preparing for gold filling; it is not only susceptible of complete adaptation to all parts of a cavity, but it clings to the walls as mortar does to a petrous surface, thus bracing and strengthening a frail tooth, which is accomplished by no other material. In case of any subsequent fracture, fresh material may be added without removing the filling. A large cavity that would consume a day's time in inserting an expensive gold filling may be filled in a few minutes with the osteo-plastic. Decay around such a filling is an unknown occurrence. Its only fault is that it becomes washed out gradually at the exposed surface, frequently to such an extent in a year or so as to require an addition; but it often lasts four or five years without a renewal being necessary."

FAILURES OF DENTAL OPERATIONS.

The chief point to be gained, in filling decayed places in the teeth, is to arrest decay; but in addition to this, where it is possible, the tooth should be restored to its original shape, or as nearly so as will best promote a healthy and useful condition, not only to itself but the adjoining teeth. The operation or the material which will best subserve this purpose is unquestionably the one to use, without regard to creed or doctrine.

The selection of materials, as well as the use of instruments and appliances, should be entrusted solely to the dentist.

All materials now in use for filling teeth are more or less foreign to the structure of the teeth and to the mouth. There is no living union between the teeth and the material. It is simply a mechanical or chemical adaptation of the material to the walls of the cavity. If the presence of any material is inharmonious to the teeth, or to the mouth, it will generally manifest itself in some form of trouble, and if the material is not properly adapted, or if the work is imperfectly performed, failure to arrest the trouble or to secure comfort, will follow.

The material selected may be the one best adapted for saving a tooth, but with imperfect or

improper manipulation it may accomplish no good, and may, in fact, be an injury to the tooth; and again an illy adapted material may be so perfectly manipulated as to preserve the tooth for an indefinite time.

Habit has much to do with the successful working of any material, and a frequent cause of failure of fillings is haste in operating. A dentist ought not to be hurried in his work. To be sure, he must employ his time to the best advantage to his patient, but he ought not to hurry his work at the expense of a perfect service. Sometimes haste is necessary, but it ought not to be on account of insufficient compensation. The patient should be willing and anxious for the dentist to be thorough, and careful, allowing him to take all the time the nature of the case requires, and under no circumstances should the importunity of the patient interfere with the judgment of the dentist.

The benefit resulting from well-adapted and serviceable fillings cannot be calculated, and the injury resulting from poor and ill-adapted fillings cannot be readily comprehended. There are various causes for the failures of fillings; sometimes it is the fault of the dentist, sometimes it is the fault of the patient, and frequently it is the fault of no one in

particular. The teeth are a part of the body, and when any part is removed and replaced by some foreign material, there is more or less of irritation and trouble. Nature will not tolerate any active aggression without resenting it, and the teeth and the mouth are not exceptions. The mouths of some people are perfect hot-houses, and yet they wonder why their fillings don't last forever. When a tooth has been filled it requires greater care to preserve it than was necessary before decay commenced. A tooth having been filled in one place does not prevent its decay in another, or in fact the same place. It must be remembered that when the causes of decay are not removed, the teeth are subject to the same influences after that they were before filling.

Fillings may fail to arrest decay while they are firm or immovable, and this fact is frequently unobserved by the patient. One must not wait for fillings to loosen before suspecting failure, for decay may destroy nearly all there is left of a tooth, while the filling is solid and undisturbed. Conditions which may seem favorable to ordinary observation cannot be relied upon, and it is sometimes quite difficult for the dentist to decide upon the course to follow, but it is always advisable in cases of

doubtful conditions, to remove the filling rather than take chances.

RENEWING FILLINGS.

Fillings should be removed as often as required to preserve the tooth from decay. It is not the preservation of the filling, but the preservation of the tooth which is sought, and if a material is employed which is in itself destructible, but which preserves the tooth, then the material must be removed as often as may be required. If the material employed is indestructible it should be removed as soon as it fails to answer its purpose, or as soon as decay or disintegration commences around any part of it. The careful observance of this rule will save much trouble and disappointment.

TREATMENT.

The accumulation of tartar, stains, &c., upon teeth cannot be successfully removed by personal treatment. The removal is a very necessary and apparently a very simple operation, but in a great many cases is attended with injury, rather than benefit, because it is hastily or imperfectly performed. Whatever is done to the teeth, or for the teeth, is worth doing well, for their highly organized structure will not permit ill treatment.

Various affections arise from permitting foreign

bodies or substances to lodge upon the teeth or impinge upon the gums. The most important of these is inflammation of the gums, and destruction of both soft and hard surrounding structure. Decay is also a frequent cause of disease to the surrounding structure, and not only causes trouble from the roughened surfaces in contact, but when permitted to involve the living portion of the teeth it causes complicated and painful affections throughout the whole facial region.

The dentist should be consulted frequently concerning the troubles which may arise, or involve any part of the mouth.

Accumulations of tartar should be removed as often as required to keep the surfaces of the teeth in a smooth and perfect condition. After removal the teeth should be polished with suitable appliances until every trace of the substance is gone.

Stains must be removed with extreme care, and only with harmless agencies.

Old roots, worthless teeth, &c., may cause serious trouble, and should not be suffered to remain in the mouth, except with the consent of the dentist.

Abscesses, diseased gums, or irritations and inflammations of any nature should be carefully treated, and cured or removed without delay.

There are various other troubles, too numerous to describe, and which require special treatment.

The healthful preservation of teeth requires a prompt and proper attention to every unnatural tendency, and only by continued application of intelligent treatment, can this be successfully accomplished.

APPLIANCES.

The spirit of the age is improvement, and dentistry is not lacking in an ambition to excel. Very few professions or arts have made greater advances in their investigations and methods of treatment.

This spirit of improvement should be encouraged by the people. Old practices must give way to new ones, as soon as the latter are found to be better calculated to lessen trouble and expense.

It will be unnecessary to notice the various appurtenances, appliances, instruments, &c., in use for filling and treating teeth, for they are almost innumerable. These things are only accessories. Any instrument will be useful or dangerous to the teeth, according to the skill and conscience of the person who uses it.

The selection of instruments should be left with the operator, who should always be guided by a delicate regard for the comfort and benefit of his

patient. All instruments, appliances, &c., which are calculated to improve the service, or lessen the pain, time and expense of dental operations, are to be commended. The intelligence which applies them will determine their character. The dentist who is thoroughly educated to his calling, and who desires to produce the best results, will only employ those agencies which he finds from experience to be best adapted to the purpose.

ANÆSTHETICS.

The dentist is frequently requested to administer chloroform, ether, nitrous oxide gas, &c., for the purpose of rendering dental operations painless, and as many errors exist regarding the nature of the articles named, and their effect upon the human physical system, a few words upon anæsthesia will be of practical use to some.

The following article was prepared by Dr. J. H. Thompson, a prominent physician of Milwaukee, and as it contains the results of many years personal experience in army life and private practice, it is earnestly commended to the careful consideration of all persons who desire correct information upon this important subject:

"Anæsthetics, literally, means any substance which has the power of so acting upon the brain

that a general or partial suspension of nervous sensibility is caused thereby; but by general consent the term is restricted to the volatile form of chemical agents which can produce this result when inhaled or applied, and the effects of which are transitory.

The general action of all anæsthetic agents is through the medium of the blood, into which they are taken, either from the lungs, stomach or skin, and carried by the circulation to the brain, where they produce a profound but transient state of intoxication. Practically, the administration of an anæsthetic is confined to the inhalation of chloroform, sulphuric ether and nitrous oxide gas, each of which is capable of producing profound anæsthesia, suspending temporarily all sensibility, enabling the the surgeon, the obstetrician and dentist to perform the most serious operations without sensible pain to the patient. It is unquestionably one of the greatest achievements of science for alleviation of human suffering, of any age, but unfortunately the administration of any one of the agents named, or that of any known anæsthetic, is not unattended with danger to life. A report made to the Massachusetts Medical Society, in 1872, gave the number of deaths to that date, from chloroform, seven hundred and eighty; from sulphuric

ether, fifty-three. In the New York Medical Journal for 1877, are reported four deaths from chloroform and one from sulphuric ether and nitrous oxide gas. For 1876, six deaths from chloroform, and one from sulphuric ether, by inhalation. It is true that the percentage of deaths under the administration of anæsthetics is comparatively small, but quite too large to justify their use in trivial operations or under any circumstances, without the constant supervision of a physician, or person competent to act promptly and understandingly in case of unfavorable symptoms.

Deaths during or immediately following the inhalation of nitrous oxide gas have too frequently occurred to maintain the reputation which this agent once enjoyed as a perfectly safe and harmless anæsthetic. No one who has witnessed the general and extreme depression of the vital functions which tend to and so nearly simulate death, under its influence, can but wonder that fatal results do not more frequently occur, when they consider the frequency and recklessness with which nitrous oxide gas is given.

Anæsthetics should never under ordinary circumstances be given to persons suffering from organic disease of the brain, heart or lungs. They should never

be given until several hours after a meal, and should be taken in as nearly a reclining position as possible. They should always be administered with the greatest possible care, and in the smallest quantities to obtain the desired result. The intelligent and conscientious physician always dreads to give any anæsthetic for minor operations, knowing full well the dangers incurred, but too frequently yields reluctant consent to the importunities of the patients, who know little of the danger they incur, or realize how near they are to death when fully under the influence of any anæsthetic."

COMPENSATION—APPRECIATION—RESPONSIBILITY.

The permanency of dental operations will depend upon the perfection of the service, and the personal attention bestowed upon them afterward.

Perfect temporary service is superior to poor service designed for permanent endurance.

Better employ a responsible dentist at any price, rather than have a charlatan do your work for nothing.

The selection of materials is sometimes perplexing to the patient as well as to the dentist. The pecuniary value of any material, however, need not influence any one in making a choice. All materials are comparatively inexpensive, and

the patient is not expected to pay for the material, any more than a client is expected to pay for the paper upon which his lawyer has written a will, or any more than a patient is expected to pay for the bandage which his surgeon has used to bind a broken limb. It is the time and skill employed upon the materials which make the operation expensive. An expensive material may sometimes be inserted in a few moments, while an inexpensive material may require hours; therefore it is not the material which will increase the expense, so much as the care, skill, judgment and patience required to work it. Gold is of course not only more expensive, but requires more appliances, time and skill, &c., to manipulate than is necessary with other materials. The preparation of the cavity for filling is one of the most important, as well as the most laborious parts of the operation. All treatment preliminary to filling usually consumes as much time and life-force for an inexpensive, as it does for an expensive material. It must be remembered that the time of a dentist is as valuable at one time as it is at another, and whoever takes the time of a dentist for any purpose, during the hours devoted to engagements or labor, takes so much capital or money from him, and for which an

adequate compensation or return should be made in money.

Good and faithful service should be acknowledged, and when it is rendered to the satisfaction of the patient, a word of commendation may possibly inspire the tired and anxious dentist, and reward him beyond the money he receives. It is often the case that dental bills are paid grudgingly, and the cost of the service is the only matter considered, but like many callings, the faithful are sometimes remembered—years afterward.

The nature of dental treatment is such that compensation can not be considered in a majority of cases, until the extent of the trouble is ascertained, and the method of treatment best adapted to the case is decided upon. Therefore contracts for dental work are generally inadmissible, for they not only hamper the dentist, but deprive the patient of the application of any better treatment which may be suggested to him as the work progresses.

"By a dentist I mean not a mere extractor and 'plugger' or inserter of teeth, or even what is called a 'splendid operator.' I mean a man who has not only been thoroughly educated and trained in all the requirements of an important profession, but who fulfills them in each case with an earnest

purpose; who looks not merely for the return in money he may obtain, but, while demanding just and full compensation for his services, keeps always in view the good of those who come under his professional care."

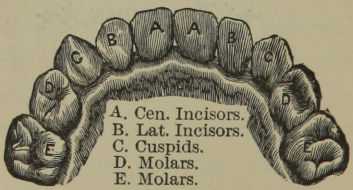
It ought to be understood by every sensible person that whenever a dentist, or a person skilled in any art or profession, is employed, he must be left entirely untrammeled. No man who is worthy of confidence will permit himself to be directed in regard to his own particular pursuit. There are, of course, certain matters, not important, which may be left to the option of the patient; but in all essential points, the course to be pursued must be entirely under the control of the professional man. When, therefore, a dentist is employed, the responsibility should be thrown entirely upon him, his directions should be carefully followed, and he should be held strictly responsible for the results of his practice.

APPENDIX.

APPENDIX.

A

Eruption of the Teeth.

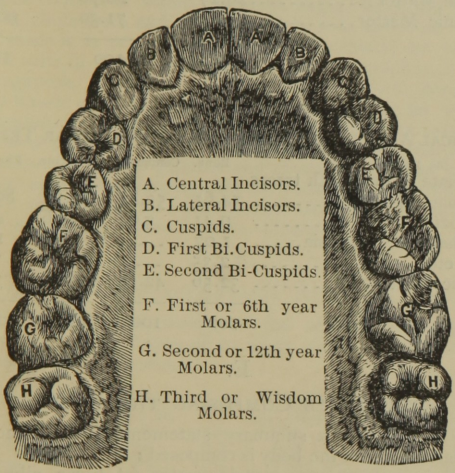


Deciduous or Temporary Teeth.

Names of the Teeth.	Time of Eruption.	Time of Shedding.
A in Fig. Central Incisors, ..	5 to 8 months.	6 to 8 yrs.
B in Fig. Lateral Incisors, ..	7 to 10 "	7 to 9 "
D in Fig. First Molars.....	12 to 16 "	9 to 10 "
C in Fig. Cuspids.....	14 to 20 "	11 to 12 "
E in Fig. Second Molars.....	18 to 36 "	10 to 11 "

The lower teeth are generally slightly in advance of the upper.

B.



A. Central Incisors.
B. Lateral Incisors.
C. Cuspids.
D. First Bi.Cuspids.
E. Second Bi-Cuspids.
F. First or 6th year Molars.
G. Second or 12th year Molars.
H. Third or Wisdom Molars.

PERMANENT TEETH.

Names of the Teeth.	Time of Eruption.
F in Fig. First Molars	5 to 6 years.
A in Fig. Central Incisors	6 to 8 "
B in Fig. Lateral Incisors	7 to 9 "
D in Fig. First Bi-Cuspids	9 to 10 "
E in Fig. Second Bi-Cuspids	10 to 11 "
C in Fig. Cuspids, eye teeth	11 to 12 "
G in Fig. Second Molars	12 to 14 "
H in Fig. Third Molars	17 to 40 "

C.

CHEMICAL ANALYSIS OF INSCISORS.

	Cementum.	Dentine.	Enamel.
Organic Matter	29.27	28.70	3.59
Inorganic Matter	70.73	71.30	96.41
	100	100	100

D.

CHEMICAL ANALYSIS OF BONES OF ARM AND MOLAR TEETH.

IN 100 PARTS.	Bone.	Cementum.	Dentine.	Enamel.
Phosphate of lime with traces of fluate of lime	54.61	53.84	66.72	89.82
Carbonate of lime	9.41	3.98	3.36	4.37
Phosphate of magnesia	1.07	.....	1.08	1.34
Salts, etc.	2.35	.....	.83	.88
Organic Matter	32.56	42.18	28.01	3.59
	100	100	100	100

E.

MATERIALS COMPOSING THE BODY.

The following is a summary statement of the principal materials of which the body is composed :

Flesh in its fresh state contains water, fat, fibrin, albumen and gelatine, besides compounds of lime, phosphorus, soda, potash, magnesia, silica and iron, and certain extractives.

Blood has a composition similar in elements to that of flesh. Bone is composed of cartilage, gelatin, fat, and salts of lime, magnesia, soda and potash, combined with phosphoric and other acids.

Cartilage consists of chondrin, which is like gelatine in composition, with salts of soda, potash, lime, phosphorus, magnesia, sulphur and iron.

The brain is composed of water, albumen, fat, phosphoric acid, osmazone, and salts.

The liver consists of water, fat, and albumen with phosphoric and other acids in conjunction with soda, lime, potash and iron.

The lungs are formed of a substance resembling gelatin, albumen, a substance analogous to casein, fibrin, various fatty and organic acids, cholesterin, with salts of soda, and iron and water.

Bile consists of water, fat, resin, sugar, fatty and organic acids, cholesterin and salts of potash, soda and iron.

Hence it is requisite that the body should be provided with salts of potash, soda, *lime*, magnesia, sulphur, iron and manganese, as well as sulphuric, hydrochloric, *phosphoric*, and fluoric acids and water; also nearly all the fat which it consumes daily, and probably all the nitrogenous substances which it requires, and which are closely allied in composition, as albumen, fibrin, gelatine and chondrin. It can produce sugar rapidly and largely, and fat slowly and sparely, from other substances; also lactic, acetic and various organic acids, and peculiar extractive matters.—SMITH.

F.

DAILY DIET ACCORDING TO WORK DONE.

The average proportions of the several constituents of food in the daily dietary of an adult man under different circumstances of existence:

Daily Diets for	Flesh former.	Fat.	Starch and Sugar,		Nitrogenous.		Carbonaceous Calculated as Starch.
	ozs.	ozs.	ozs.		ozs.		ozs.
Subsistence only...	2.0	0.5	12.0	=	2.0	+	13.3
Quietude	2.5	1.0	12.0	=	2.5	+	14.5
Moderate exercise	4.2	1.8	18.7	=	4.2	+	23.2
Active labor.....	5.5	2.5	20.0	=	5.5	+	26.3
Hard Work.....	6.5	2.5	20.0	=	6.5	+	26.3

G

COMPOSITION OF MILK.

	Human Milk.	Cows' Milk.	Goats' Milk.	Ewes Milk.
Casein	1.52	4.48	4.02	4.50
Butter.....	3.55	3.13	3.32	4.20
Sugar of Milk.....	6.50	4.77	5.28	5.00
Various salts.....	0.45	0.60	0.58	0.68
Total Solids.....	12.02	12.98	13.20	14.38
Water.....	87.98	87.02	86.80	85.62
Total.....	100.00	100.00	100.00	100.00

H

Table of Nutritive Values of Food.

	Water.	Albumen, &c.	Starch, &c.	Sugar.	Fat.	Salts
Bread, ordinary	37	8.1	47.4	3.6	1.6	2.3
Average wheat flour	15	10.8	66.3	4.2	2.0	1.7
Buckwheat	12.754	2.645	82.744	2.850	9.14	—
Barley meal	15	6.3	69.4	4.9	2.4	2 0
Oatmeal	15	12.6	58.4	5.4	5.6	3.0
Rye meal	15	8.0	69.5	3.7	2.0	1.8
Indian meal	14	11.1	64.7	0.4	8.1	1.7
Rice	13	6.3	79.1	0.4	0.7	0.5
Peas	15	23.0	55.4	2.0	2.1	2.5
Arrowroot	18	.....	82.0	....	....	....
Potatoes	75	2.1	18.8	3.2	0.2	0.7
Carrots	83	1.3	8.4	6.1	0.2	1.0
Parsnips	82	1.1	9.6	5.8	0.5	1.0
Turnips	91	1.2	5.1	2.1	...	0.6
Sugar	5	...	...	95.0	...	...
Treacle	23	...	...	77.0	...	...
New milk	86	4.1	...	5.2	3.9	0.8
Cream	66	2.7	...	2.8	26.7	1.8
Skim milk	88	4.0	...	5.4	1.8	0.8
Buttermilk	88	4.1	...	6.4	0.7	0.8
New milk cheese	36	28.4	...	...	31.1	4.5
Skim milk cheese	64	44.8	...	...	6.3	4.9
Lean beef	72	19.3	...	...	3.6	5.1
Fat beef	51	14.8	...	...	29.8	4.4
Lean mutton	72	18.3	...	...	4.9	4.8
Fat mutton	53	12.4	...	...	31.1	3.5
Veal	63	16.5	...	...	15.8	4.7
Fat pork	39	9.8	...	...	48.9	2.3
Green bacon	24	7.1	...	...	56.8	2.1
Dried bacon	15	8.8	...	...	73.3	2.9
Ox liver	74	18.9	...	...	4.1	3.0
Tripe	68	13.2	...	...	16.4	2.4
Poultry	74	21.0	...	...	3.8	1.2
White fish	78	18.1	...	...	2.9	1.0
Eels	75	19.9	...	...	13.8	1.3
Salmon	77	16.1	...	...	5.5	1.4
Entire egg	74	14.0	...	...	10.5	1.5
White of egg	78	20.4	...	...	...	1.6
Yolk of egg	52	16.0	...	...	30.7	1.3
Butter and fats	15	...	...	...	83.0	2.0
Beer and porter	91	0.1	...	8.7	...	0.2

I.

Relative Digestibility of Animal Substances.

Articles of diet.	How cooked.	Time of chymification. H.	M.
Pigs' feet (soused)	Boiled	1	0
Tripe (soused)	Boiled	1	0
Eggs (whipped)	Raw	1	30
Salmon trout	Boiled	1	30
Venison steak	Broiled	1	30
Brains	Boiled	1	45
Ox liver	Broiled	2	0
Codfish (cured dry)	Boiled	2	0
Eggs	Roasted	2	15
Turkey	Boiled	2	25
Gelatine	Boiled	2	30
Goose	Roasted	2	30
Pig (sucking)	Roasted	2	30
Lamb	Broiled	2	30
Chicken	Fricasseed	2	45
Beef	Boiled	2	45
Beef	Roasted	3	0
Mutton	Boiled	3	0
Mutton	Roasted	3	15
Oysters	Stewed	3	30
Cheese	Raw	3	30
Eggs	Hard Boiled	3	30
Eggs	Fried	3	30
Beef	Fried	4	0
Fowls	Boiled	4	0
Fowls	Roasted	4	0
Ducks	Roasted	4	0
Cartilage	Boiled	4	15
Pork	Roasted	5	15
Tendon	Boiled	5	30

K

Relative Digestibility of Vegetable Substances.

Articles of Diet.	How prepared.	Time of Chymification. H.	M.
Rice	Boiled	1	0
Apples (sweet and mellow)	Raw	1	30
Sago	Boiled	1	45
Tapioca	Boiled	2	0
Barley	Boiled	2	0
Apples (sour and mellow)	Raw	2	0
Cabbage with vinegar	Raw	2	0
Beans	Boiled	2	30
Sponge cake	Baked	2	30
Parsnips	Boiled	2	30
Potatoes	Roasted	2	30
Potatoes	Baked	2	33
Apple dumpling	Boiled	3	0
Indian corn cake	Baked	3	0
Indian corn bread	Baked	3	15
Carrot	Boiled	3	15
Wheaten bread	Baked	3	30
Potatoes	Boiled	3	30
Turnips	Boiled	3	30
Beets	Boiled	3	45
Cabbage	Boiled	4	0

N.

Composition of Saliva.

Water	992.9
Ptyalin	2.9
Mucus	1.4
Extracts of flesh with alkaline lactates	.9
Chloride of sodium	1.7
Soda	.2

M.

Composition of Tartar.

Phosphate of lime	60
Carbonate of lime	14
Animal matter and mucus	16
Water and loss	10

L.

Hygienic Griddle Cakes.

(A substitute for Buckwheat.)

Three cups purified middlings.
One cup Graham flour.
One egg.
One tea spoonful saleratus.
A little salt.
Mix with sour milk.
Use a hot griddle and serve immediately.

N. B.—The *purified middlings* can only be procured at mills where the patent process of manufacturing is employed. Therefore only order from reliable dealers. The above formula can be varied to suit the taste of individuals by substituting corn meal, patent flour or purified middlings, in place of the Graham flour.

Syrups.

A healthful, palatable and inexpensive syrup to accompany these cakes, can be made at home, and it is recommended in place of the deleterious compounds for sale by dealers.

Take equal parts of pure white sugar and water. Boil until the desired consistency is obtained. Vanilla or other extracts can be added when cold, if flavor is desired.

O.

A Harmless Dentifrice.

A pleasant and reliable preparation of tooth powder can be made by the following formula:

English Precipitated Chalk.....7 ounces
Powdered Borax.....4 drams.
Bi-Carb Soda.....4 drams.
Cardamon Seed, finely powdered and sifted.....2 drams.
Powdered White Castile Soap.....4 drams.
Powdered White Sugar.....2 ounces

Mix thoroughly and flavor to taste with oil of wintergreen.

Note.—Especial care should be taken to have the sugar, cardamon seed, borax and soda, *finely powdered*, also use only the best grade of soap.

P.

To Prepare Lime Water.

Take a piece of unslacked lime about the size of an English walnut, and place it in a pint-bottle, previously filled with fresh rain or distilled water. Shake the bottle a few times, and after allowing it to stand for two or three hours, the deposit of lime will settle to the bottom of the bottle, leaving a clear preparation of lime water ready for use. This can either be carefully poured off into another bottle, and kept corked, or be allowed to remain in the original bottle, as made; in the latter event the deposit of lime in the bottle tending to keep the water always of full strength.

For Preparing a Solution of Bi-Carb. Soda.

Follow the above direction, only substituting the same quantity of English Bi-Carb soda, in place of the unslacked lime.