A popular treatise on the teeth / by Matthew Dickie.

Contributors

Dickie, Matthew.
University of Glasgow. Library

Publication/Creation

Glasgow : Porteous Brothers, [1870]

Persistent URL

https://wellcomecollection.org/works/yxwyrnrk

Provider

University of Glasgow

License and attribution

This material has been provided by This material has been provided by The University of Glasgow Library. The original may be consulted at The University of Glasgow Library. where the originals may be consulted.
This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.

wellcome collection

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org

A

POPULAR TREATISE

ON THE

TEETH

BY

M. DICKIE

SURGEON DENTIST

GLASGOW

UNIVERSITY
of
GLASGOW

James Ireland
Memorial Library

Dent BL
Case
Medicine
UD 8
1870-D

3O114O11228767

Glasgow University Library

ALL ITEMS ARE ISSUED SUBJECT TO RECALL

GUL 96.18

Digitized by the Internet Archive
in 2014

https://archive.org/details/b21452234

A

POPULAR TREATISE

ON THE

TEETH.

BY

MATTHEW DICKIE,

SURGEON-DENTIST,

GLASGOW.

PUBLISHERS: PORTEOUS BROTHERS, GLASGOW,

AND ALL BOOKSELLERS.

PRINTED BY
DAVID WILSON, 14 MAXWELL STREET,
GLASGOW.

GLASGOW
UNIVERSITY
LIBRARY

PREFACE.

In the following pages of this work I have endeavoured to describe briefly, and in a popular manner, the principal diseases of the teeth—pointing out their causes and remedies. Comparatively few take the precautions necessary for their preservation, and consequently seem to estimate lightly their importance; but if we would measure their *value* according to their *utility*, we will find that they occupy a high rank among the parts of our outward system. They perform the very first process on our food, are indispensable for proper digestion, and when in a healthy state, add beauty to the countenance.

I have availed myself of all the information I could get from various eminent writers on dentistry, and more particularly am I indebted to Harris, Bell, and Tomes.

M. D.

47 Sauchiehall Street,

Glasgow, *April*, 1870.

[ENTERED AT STATIONERS' HALL.]

CONTENTS.

CHAPTER I.

Dentition— PAGE

The Formation and Evolution of the Teeth, - - 5

Abnormal Dentition, - - - - - - 15

CHAPTER II.

The Teeth, - - - - - - - - - 30

The Temporary Teeth, - - - - - 31

The Permanent Teeth, - - - - - 32

The Composition of the Teeth, - - - - 32

The Enamel, - - - - - - - - 34

Differences of the Temporary and Permanent Teeth, 37

CHAPTER III.

Diseases of the Teeth, - - - - - - - 38

Caries of the Teeth, - - - - - - 40

The Causes of Caries, - - - - - - 42

Exciting Causes of Caries, - - - - - 45

Prevention of Caries, - - - - - - 50

Treatment of Caries, - - - - - - 51

CHAPTER IV.

PAGE
Deposits upon the Teeth, - - - - - - - 53
Method of Removing it, - - - - - - 56

CHAPTER V.

Irregularity of the Teeth, - - - - - - - 59

CHAPTER VI.

Atrophy of the Teeth, - - - - - - - - 62
The Cause, - - - - - - - - - 64
Treatment, - - - - - - - - - 65

CHAPTER VII.

Necrosis of the Teeth, - - - - - - - - 66
Causes of Necrosis, - - - - - - - 68
Treatment, - - - - - - - - - 68

CHAPTER VIII.

Exostosis of the Teeth, - - - - - - - - 70
The Cause, - - - - - - - - - 72

CHAPTER IX.

Diseases of the Dental Pulp, - - - - - - 73
Acute Inflammation of the Dental Pulp, - - 75
Chronic Inflammation, - - - - - - 78

CHAPTER X.

Toothache, - - - - - - - - - - 80
The Causes, - - - - - - - - 81
Treatment, - - - - - - - - - 88

CHAPTER XI.

PAGE

A Comparative View of the Teeth of Man and Animals, - 90

CHAPTER XII.

The Value and Importance of the Teeth, as regards Health, Comfort, Personal Appearance, &c. - - 92

CHAPTER XIII.

How the Teeth may be Preserved, - - - - - - 99

CHAPTER XIV.

Artificial Teeth, - - - - - - - - - 104

Teeth of Cattle, - - - - - - - - 108

Tusks from the Elephant and Hippopotamus, - 109

Porcelain, or, as they are sometimes called, Incorruptible Teeth, - - - - - 109

CHAPTER XV.

The Gums and some of their Diseases, - - - - 111

Their Treatment, - - - - - - - 117

CHAPTER XVI.

Anæsthetics: Their Use in the Extraction of Teeth, - 122

Local Anæsthesia, - - - - - - - 126

Electro-Magnetism, - - - - - - - 129

CHAPTER I.

DENTITION.

The Formation and Evolution of the Teeth,—Abnormal Dentition.

THE varied processes the teeth undergo in their formation, development, and arrangement, are among the most curious and complicated operations of the animal economy. The different periods of dentition in the human being point out distinct epochs of human life, in which great and important changes occur in the physical frame, whilst at the same time new mental powers are developed.

The teeth differ in their organization in many respects from all the other organs of the body. They are placed in the arches of the upper and

lower maxillary, or jaw-bones, and are of a bony structure; they are composed of two sets, one of which is intended to last for a short period only, but the other is destined to last during the person's life time; the former set is called the temporary, and the latter the permanent; the number of the temporary teeth is twenty, they are not so large as the permanent ones, their texture is less firm and solid, and their characteristic forms and prominences are not so distinctly marked; the permanent teeth are thirty-two in number, and are arranged in perfect uniformity, eight being on each side of the jaw, those on the one side exactly corresponding with those on the opposite. They are usually divided into four distinct kinds or classes, each presenting its own peculiarities in size, form, development, articulation, and use, namely, on each side of the jaw two incisors, one cuspidatus, two bicuspides, and three molars. Of all the operations of the animal economy, none are more wonderful and astonishing than those by which the teeth assume their ultimate form, position, and relations.

Long before the period of birth provision is made for the production of the teeth, but as this treatise is more of a popular than a scientific character, it is not its province to treat of the teeth from their first formation and development.

If we carefully examine the jaws of a child at birth, we will find that the alveoli of the temporary incisors and cuspidati are formed, although perhaps not distinctly, and also the alveoli of the molars are partially formed. Ossification has advanced on all the temporary pulps so as to form shells of bone, reaching somewhat over their crowns, and it has also commenced, although minutely, on the first permanent molars. The roots of the teeth continue to get larger until the incisors, first of all, and afterwards the others, can no longer be retained within the alveoli, then it is that preparation is made to facilitate their passage through the gums by absorption of the containing parts. The tooth has now arrived at that stage when it begins to press upon the gum, but a portion of the sac is still interposed, as this membrane has already secreted the enamel,

it becomes absorbed at the point where pressure is first made, and the gradual removal of the sac and gum is the consequence.

The time when the teeth make their appearance varies very much, and often without any reference to the constitutional powers of the child. There are instances on record where children have been born with two or three teeth, and in many instances they have not made their passage through the gums until the fourteenth or sixteenth month, and in not a few instances as late as two or three years of age, but the general rule is that dentition takes place at the age of from five to eight months. They generally come in the following order, the teeth of the inferior jaw almost always precedes those of the superior for a longer or shorter time:—

From 5 to 8 months, the four central incisors.
„ 7 „ 10 „ „ „ lateral incisors.
„ 12 „ 16 „ „ „ anterior molars.
„ 14 „ 20 „ „ „ cuspidates.
„ 18 „ 36 „ „ „ posterior molars.

It is not to be understood that this is always the

case, but it is the general rule, and liable to many exceptions, not only in the time in which the different teeth appear, but also in the relative order of their becoming visible.

Dr. Ashburner, who has paid great attention to this subject, and who has had ample opportunities of observation, says "that the teeth of the first dentition commonly cut in couples, the two anterior incisors of the lower jaw appear first, then in perhaps from fifteen to twenty days the two anterior incisors of the upper jaw come through, to these succeed the lateral couple of incisors of the lower jaw, then come those of the upper jaw. After these the two molar teeth nearest to the lateral incisors of the lower jaw appear, then the first molars of the upper jaw, after which come the lower two canine, then the upper canine, then the two second molars of the lower jaw, and afterwards the corresponding molars of the upper jaw. The period occupied in the process is about two years from the appearance of the first tooth."

The anterior molars are the first formed of the

permanent teeth, upon which the first points of ossification may be seen at birth. The ossification of these teeth and of the permanent incisors has advanced considerably when the child has reached the age of twelve months, and it has also commenced on the lower cuspidati, for the upper ones are generally two or three months later. Ossification is also found on the points of the bicuspides, about the time when all the temporary teeth have made their appearance, and the bony shells of the teeth that have been mentioned above have increased very much in size.

The permanent teeth are larger than the temporary ones, and are situated during their progress a little behind them. Hence they are confined within the segment of a smaller circle, consequently, they must become much crowded in the jaw as they approach more nearly to their ultimate size. "The examination of the maxillary bone of a child about five years old," observes Dr. Bell, "will show this fact in a very striking manner. At this period the jaws being considerably deepened by the develop-

ment of the alveolar processes, the sockets in which the permanent teeth are lodged will be found placed beneath those of the temporary, some higher than others, and the bony shells are closely packed in such a manner as to occupy the least possible space thus, in the upper jaw the central incisors are situated immediately beneath the nose, the lateral incisors thrown back behind the points of the cuspidati, and the bases of the latter scarcely a quarter of an inch below the orbit; in the lower jaw the cuspidati are placed at the very base of the bone, with only a thin layer beneath them, but the crowding is much less considerable than the upper jaw, from the smaller comparative size of the incisors.

"At from six to seven years of age, the whole of the permanent teeth are more or less ossified, excepting the dentes sapientiæ, so that previously to the shedding of any of the temporary teeth, there are at this time no less than forty-eight teeth in two jaws, namely, twenty deciduos, the whole of which are perfected, and twenty-eight permanent,

in different degrees of development within the bones."

At a certain time of our existence the temporary teeth are exchanged for a more numerous set of a stronger and more durable structure, and of an increased power of mastication. When this is about to happen, the original or temporary teeth become loose in their sockets, their roots are eaten away, their crowns crumble and recede from the gums, and at last, having become useless, fall out. The order in which this change takes place in the temporary teeth is exactly the same as that in which they were originally formed, and which they cut through the gums. Thus the central incisors of the lower jaw make their appearance first, and they are the first to fall away, then those of the upper jaw, then go the interior lateral incisors, and so on with the others. This is called the shedding of the teeth, and the manner in which this change is affected is by a process of absorption. The absorbent vessels remove the anterior walls of the cavities in which the permanent teeth are contained,

and this allows the teeth to advance next the sockets, then the roots, and lastly the crowns of the temporary teeth are absorbed. What is the cause of this absoption? It cannot entirely be the pressure produced by the advancing permanent teeth, for the process goes on when such pressure cannot possibly have existed. What then is it? It is, partly at least, like the preparation of the cell for the reception of the permanent pulp, a true process of anticipation. Nor do the advancing permanent teeth displace the deciduous teeth, but the jaw enlarges itself consentaneously with the increasing bulk and number of the teeth which it is destined to receive

It is generally about seven years of age when the change takes place of the temporary for the permanent teeth. The first permanent molars usually make their appearance before the loss of the temporary central incisors, and their appearance may be taken as a proof of the approaching change. The following are the medium periods in which the different permanent teeth make their appearance, but they are so irregular in their time of cutting the

gum, that comparatively little dependence can be relied on such a statement. As the lower generally precede the upper by two or three months, they are here pointed out—

Anterior molars,	- - -	6½ years.
Central incisors,	- - -	7 „
Lateral incisors,	- - -	8 „
Anterior bicuspides,	- - -	9 „
Posterior bicuspides,	- - -	10 „
Cuspidati,	- - - -	11-12 „
Second molars,	- - -	12-13 „
Third molars or dentes sapientiæ,		17-19 „

Such are the principal phenomena that relate to dentition, when this takes place in a natural and healthy manner. But this does not always take place, for it is very easily deranged, causing diseases in the system which are sometimes very dangerous and often ending fatally. The preceding account of the natural process of dentition will enable us the more readily to understand the nature, extent, and causes of the diseases which attend the abnormal state.

ABNORMAL DENTITION.

It may be said that every infant at the period of its birth is imperfectly organized, for there is no structure, and scarcely any tissue of its body, which has attained its due consistency and firmness. Many of the most important organs are wholly rudimentary, and not one of them is perfect either in structure or function. The great process that is unceasingly at work in every part is development. "The capillary arteries, the immediate agents by which this process is affected, are the masons and architects by which the various structures are built up, the modellers by which the due form and the relative bulk of the different organs are communicated and preserved by the absorbent vessels, and the regulators and controllers of these agents, and of every other power concerned in carrying on the processes of nutrition and growth, are the nerves, and the great central masses in connexion with the nerves, the spinal chord and brain. Hence the sanguiferous system, in all the varied states in which it is ministering to the function of secretion, is in

incessant activity, and the absorbent and nervous systems must necessarily be in a proportionate state of activity. It is indispensible to the due progression of the formative processes that there be maintained a perfect balance between all these varied and complex actions, a failure or diminution in the action of one system, or a disproportionate energy on the part of either, will at once disturb that balance and produce the most serious evils in the economy. At the age of infancy such a disturbance the more readily occurs, on account of the imperfect condition of every portion of the organism, no part having yet acquired the firmness of maturity, nor the power of resistance which belongs to mature and perfect structures."

The teeth and the jaws that are to contain them are amongst the first organs that are developed, as they are essential for the performance of a primary and indispensable function, namely, that of nutrition. The fœtus derives its nourishment from its mother, consequently, it does not require teeth, and for a considerable time after birth there is no teeth, as the

child is still dependent upon its mother for its nutrition. But the infant is destined to possess an existence entirely independent of its mother, and from the moment of its birth, yea, long before its birth, a process of preparation was going on in its system, which had for its object the formation of an apparatus which would enable it to prepare and digest food for itself.

This apparatus, from its very formation, possesses a highly organized and delicate structure, and moreover, from the very peculiar position in which in its progressive development it is placed, it is surrounded with many difficulties which at first sight would seem insurmountable. First of all the formation of a bony structure has to take place, and to penetrate the thick substance of which the gums are composed, and at the same time, the jaws have to attain a size and form fitted to receive these structures when duly prepared and evolved. Should the teeth be too quick in their evolution, or the jaws too slow in their growth, serious evils may be produced in the system by the disturbance of

that balance which has been already stated to be so indispensable to the orderly and safe progress of the developmental actions.

Assuming the formation of the teeth in the jaws to have gone on naturally up to the proper time of their evolution, at that period they are enveloped in a firm membranous covering, and are also covered by the thick and dense gum. Both the membrane and the gum are absorbed to make way for the passage of the teeth. The accomplishment of this absorption is either by a stimulant communicated to the absorbent vessels, or by the mere presence of the tooth without direct pressure, or by a moderate and gradual pressure produced by the advancing tooth. But this process, although it takes place in quite a natural manner, almost always produces local inflammation. The child evinces this in its desire to press everything within its grasp against the gum, and if examined it will be seen to be swollen, red, and apparently itching. Not only is the gum irritated, but the irritation extends to the salivary organs placed in the mouth, and this is

shown by the increased flow of saliva, which becomes more or less changed, both in its quality and quantity, being generally thicker and more tenacious than in its healthy state. These symptoms of local irritation are usually accompanied by a slight degree of constitutional disturbance, the skin becomes hotter and drier, the face flushed, the bowels more relaxed, and the child itself more restless and fretful than usual. The irritation of the gum, when moderate, seems to be nothing more than what is necessary to the developmental process that is taking place, "The effect of the local irritation, namely, a determination of the blood to the salivary apparatus, which occasions an increased flow of saliva, and that of the constitutional disturbance, namely, a determination of blood to the mucous membrane of the intestines, occasioning diarrhœa—appear to be remedial, rather than morbid—to be evacuations established by nature for the purpose of relieving over distended vessels, and over excited nerves."

When the child is in a healthy state, and the process of dentition goes on in a natural manner, the

evils usually accompanying it amount to no more than what has been described above, but should the child be in a state of congenital or acquired disease, or should the natural course of dentition be in any way disturbed, serious evils occur which often terminate fatally. If the formative process go on proportionately faster than the absorbent process, or if the teeth grow quicker than is commensurate with the action of the absorbents, the natural consequences are, that the tooth is pressed up against the gum, that the investing membrane is compressed between them, and that this pressure is communicated to the delicate and soft pulp, on which the organization of the tooth is still proceeding. The effects of the irritation thus produced will differ according to the degree of pressure, the sensibility, and irritability of the child, and the predisposition of its constitution to disease. In some it may produce only a slight aggravation of the ailments described, but in others it may have the effect of producing every form of disease to which infancy is subject.

The following is from an eminent Doctor, in speaking of abnormal dentition: "In the infant, the mucous membrane which lines the alimentary canal, from its commencement in the mouth to its very termination, is highly sensitive and irritable; the membrane which covers the external surface of the body, the skin, which possesses essentially the same structure as the internal lining membrane, and between which there is the most intimate sympathy, is alike sensitive and irritable; the mucous membrane which lines the air passages, and which forms the air-vesicles of the lungs, is scarcely less sensitive and irritable. Morbid irritation excited in any of these extended and most important surfaces is readily propagated to the great nervous centres, the spinal chord and brain, in which are induced, often with extreme rapidity, some of the most formidable diseases to which the human body is subject, and from diseases established in the spinal chord and brain, disease is reflected back upon the muscles. Thus the most prominent diseases produced by abnormal dentition have their seat in the

stomach, the intestines, and all the organs which form a part of the digestive apparatus, in the external skin, in the air passages and lungs, in the spinal chord and brain, and in the muscles of voluntary motion."

"The irritation attendant on abnormal dentition commences in a portion of the mucous surface of the digestive apparatus, and from its source in the mouth it is readily propagated to the stomach, intestines, and liver, producing in the stomach pain, nausea, vomiting, &c.; in the intestines, griping pains, flatulence, diarrhœa; in the liver, disordered secretion of the bile, &c. The external skin, sympathizing with the irritation set up in the internal mucous surface, is constantly affected with eruptions of various names and natures, sometimes attacking the scalp, sometimes surrounding the lips and extending over the face, and at other times extending over the whole body."

Abnormal dentition may be the cause of fatal disease long before the cutting of the teeth. The vessels surrounding the soft and delicate pulp, and

the fine membrane that envelop the whole rudimentary tooth may become swollen, and thus compress the dental and even the maxillary nerves, and the pressure thus exerted on these nervous tendrils may, under certain conditions, be equivalent to pressure directly applied to certain parts of the brain. Hence it is that irregularity in the course of growth, at the earlier period of teething, may produce a sufficient degree of pressure to excite a high degree of irritation in the brain, producing sometimes fatal convulsions. There are many striking cases of this kind on record, of which the following brief history may serve for an example :—A fine healthy looking child, of a strong healthy mother, died when thirteen weeks old, of a convulsive fit. The cause of death was ascertained, at the earnest wish of the mother, by a careful examination of the body after death. The internal organs, for the most part, were healthy, the stomach contained only a little milk, the mucous surfaces of the intestines were free from disease, the contents of the thorax were healthy. In the head the membranes that envelop the brain, and

more especially the pia mater, were more tinged with blood than natural, but the brain itself was healthy. The jaws were carefully examined, the capsules of the incisor teeth were large and very vascular, and much more advanced than usual, with a lancet; the cartilaginous rim of the lower jaw was attempted to be removed, with the view of exposing the capsules of the molar teeth, but these were so unusually distended with fluid, that the instrument cut into them and let it out. This was an instance of development proceeding too hastily.

The symptoms of irritation that usually accompany the evolution of the teeth, generally appear about the third or fourth month, and they usually precede the appearance of the teeth by many weeks. Sometimes these symptoms subside and re-appear a short time before the teeth make their way through the gums.

It is not only to the period of infancy that disease of abnormal dentition is confined, for children whose constitution is naturally irritable, and in whom the maxillæ are imperfectly formed, irruption of the

permanent teeth is sometimes attended with serious disorders. Nor is even the period of youth altogether free from disease resulting from the same cause, for sometimes the teeth are delayed long beyond their usual time from coming through the gum, and sometimes the development of the jaws is imperfect at the time when the dentes sapientiæ are about to make their appearance, and the consequence is that delicate, nervous, and irritable individuals are often affected with swelling of the parotid and submaxillary glands, painful, and sometimes periodical, affections of the ear and face, irregular convulsions and epilepsy. These diseases have often at once disappeared, either upon the irruption of the teeth, or on the removal of the local irritation.

It is a fact worthy of notice that the lower animals are entirely free from such diseases, or any ones analogous to them, resulting from the evolution of their teeth, and the reason that they are produced in the human species is owing entirely to the unnatural circumstances in which the infant is placed in the present artificial state of society. There are

many causes at work producing these evils, the chief of which are the following:—1. The food which nourishes the body is often unnatural in quality, and too much is supplied at one time. The infant, during the early months of its existence, is often fed with food foreign to its natural food, human milk, and that food is either digested or it is not. If it be not digested numerous ailments are produced, if it be digested the system is too highly nourished, and therefore becomes too full of blood, and the consequence is that any of the diseases above described may be the result. 2. It is a very common practice in this country to keep the heads of the infants too warm, by wearing flannel caps, covering them with heavy shawls whenever they require to be taken out, in order, as their mothers say, that they may not catch cold. Now there is a great natural determination of blood to the head, and this practice of keeping the head rolled up in flannel caps, &c., favours this flow of blood to the head, which operates more powerfully than may at first sight be apparent to cause disordered dentition.

3. The want of pure air, which is so common in large towns and cities, combined with the want of healthy exercise, and the close confinement in heated apartments, are also great sources of evils attendant upon dentition. The diseases attendant upon abnormal dentition are numerous and formidable, and the treatment of them cannot be conducted properly without a constant reference to the causes which produce them. The greatest care should be taken in regulating the diet, air, clothing, exercise, and the state of the bowels, without which nothing can be effectually done to prevent the occurrence of the most formidable of these diseases. When they are actually present no remedies ought to be used but those of a palliative character, and their aim should be to rectify everything that is faulty in diet, clothing, &c., &c., also to remove the pressure upon the nerves, produced by the advancing and unliberated tooth, which is the cause of all the mischief. "As soon as any of the affections now described, or any others which can possibly be supposed to arise from this cause, make their appearance, the

gums should be carefully examined, and wherever there is any unusual redness or turgescence, and especially if it occur over the part where the next tooth is expected to appear, the including parts should be freely and effectually divided. It is not sufficient the incision should merely pass through the gum, the lancet must be carried down to the rising tooth itself, and only stopped when the resistance of its point is felt against the edge of the instrument. The form of the gum lancet should be broad, and somewhat rounded, and its edge extremely sharp. The only precaution necessary in its use, is to direct it in making the incision that the cord of connexion between the temporary and permanent tooth shall be carefully avoided, which is readily insured by directing the edge rather towards the outer part of the gum."

"The prejudicies of former times against this simple and most efficatious operation are fast yielding to the frequent evidence of its harmlessness and utility. It is impossible for the most prejudiced to witness the effects which continually result from it, without

being a convert to its use. In the midst of the most imminent danger, when death has almost been anticipated as the only relief from severe and hopeless suffering, this simple and trifling operation has, in innumerable instances, restored the little sufferers to their parents in a state of ease and safety, and in so short a space of time as would scarcely have appeared credible."

There are few cases in the management of disease which require more prompt decision in the application of remedies, or more judicious selection of remedial agents, than some of the sympathetic affections which have been now adverted to. Indeed, life itself will often depend on the choice of the remedy which is made, and the cautious boldness with which it is administered.

CHAPTER II.

The Teeth,—The Temporary Teeth,—The Permanent Teeth,—The Composition of the Teeth,—The difference between Temporary and Permanent Teeth,—The Pulp,—The Dentine,—The Enamel,—The Cementum.

THE teeth have very important duties to perform in the economy of the human system. They are the prime organs of mastication and maceration, are the hardest portions of the body, and are implanted in the alveolar cavities of both the upper and lower jaw.

A tooth is composed of four distinct structures. 1. The pulp, occupying the chamber in the crown, and the canal extending through the root. 2. The dentine, which constitutes the principal part of the organ. 3. The enamel, which forms the covering

and protection of the crown. 4. The cementum, which covers the root.

The teeth of first dentition, which are called the milk, temporary, or deciduous teeth, are designed merely to supply the wants of childhood, and are replaced by a larger, stronger, and more numerous set. These are named the permanent or adult teeth, and are intended to continue through life.

Anatomists usually divide the tooth into three distinct parts. 1. The crown, or exposed part situated above the gum. 2. The root, occupying the alveolar cavity or socket. 3. The neck, which is the constricted portion between the crown and the root.

THE TEMPORARY TEETH.

It is usual to divide the temporary teeth into three classes. First, the incisors; second, the cuspids or canine teeth; third, the molars, which are succeeded by the bicuspids or premolars.

The temporary teeth are twenty in number, ten in each jaw, namely:—four incisors, two cuspids, and four molars.

It may be here mentioned that the pulp cavity in a temporary tooth is much larger, in proportion to the size of the organ, than it is in a permanent tooth.

THE PERMANENT TEETH.

The permanent teeth are thirty-two in number, sixteen to each jaw—making an increase of twelve over the temporary ones, and are named as follows:—incisors, four; cuspids, two; bicuspids or premolars, four; molars, six in each jaw. The last molar is often called the *dens sapientiæ* or wisdom tooth.

THE COMPOSITION OF THE TEETH.

Before proceeding with a description of the diseases of the teeth, it will be advisable to know of what they are composed. A tooth is not a simple substance, as many suppose, but compound, consisting of pulp, dentine, enamel, and cementum.

The pulp is that part from which the dentine is formed, and occupies the cavity in the centre of the tooth. It is an exceedingly sensitive, and very vascular substance, of a reddish-grey colour, and is

enveloped in an exquisitely delicate membrane. This substance is chiefly composed of minute vesicular cells, placed in concentric layers, and is plentifully supplied with blood vessels, which pervade its entire body.

The dentine, of which the great part of the tooth is composed, is an exceedingly hard, dense substance. It consists of earthy salts and animal matter, the former of which may be removed by the action of acids, leaving the latter entire. The animal portion may be destroyed by subjecting it to a strong heat. Dentine is harder than either bone or cementum, but less dense than enamel. It is a highly sensitive substance, for if by any accident a small portion of enamel is broken off, and the dentine exposed to the least variation of temperature, it produces great pain. This sensitiveness is more acute in the teeth of the young than the old, and more especially so, when attacked by caries.

Every 100 parts of dentine, according to Berzelius, contains—

Phosphate of lime, - - -	62.
Fluate of lime, - - -	2.
Carbonate of lime, - - -	5.5
Phosphate magnesia, - -	1.
Soda and muriate of soda, -	1.5
Gelatine and water, - - -	28.
	100.

THE ENAMEL.

THE enamel covers the crown and runs along to the neck of the tooth. It is pearly white, or slightly tinged with yellow, according to the texture of the tooth, and is the hardest of all animal substances. It varies in density like the dentine, as it is found to be harder in some teeth than in others. The parts of the teeth where the enamel is thickest, are on the eminences of the molars and bicuspids, and the cutting edges of the incisors. Owing to its peculiar structure it is possessed of great strength, and is capable of sustaining great pressure. The surface has a smooth and glossy appearance, and there are nice fine ridges and furrows on the permanent teeth that are not on

the temporary ones. The enamel consists of organic and inorganic matter.

Its chemical composition, according to Berzelius, is—

Phosphate of lime, - - -	85.3
Fluate of lime, - - -	3.2
Carbonate of lime, - - -	8.0
Phosphate of lime, - - -	1.5
Soda and muriate of soda, -	1.0
Animal matter and water, -	1.0
	100.

Cementum, or *crustra petrosa*, covers the root of the teeth, beginning where the enamel terminates, and gradually increases in thickness to its apex. Some animals, however, have the crowns of the teeth covered with it, and, as in the case of the elephant, it unites with the dentine and enamel, and forms a solid tooth. Like the dentine, cementum is arranged in concentric layers, and is also cellular, the cells being dispersed through it.

It is much thicker on the permanent teeth than

the temporary, and is thicker on the teeth of old persons than young.

Cementum is composed, according to Von Bibra, thus—

Organic matters, - - -	29.42
Inorganic matters, - -	70.58
	100.00

It will be easily seen from the above, that the cementum contains a larger proportion of organic matters than dentine, and is therefore endowed with a greater amount of sensibility. This accounts for the fact, that when the root of a tooth is exposed by the recession of the gums, the slightest touch produces the most acute pain. The cementum is required for the preservation of the connection between the teeth and the general system, for if the dentine were not covered by it, these organs would act as irritants, and nature would make an effort to expel them from the body. We see in this, as in everything else connected with animal economy, the wisdom and design of an all-wise Creator.

DIFFERENCES OF THE TEMPORARY AND PERMANENT TEETH.

THE temporary and permanent teeth differ in many respects, and as this cannot be better described than in the words of the celebrated Dr. Harris, of America, we will here transcribe them:—

"The temporary teeth are, generally speaking, much smaller than the permanent, of a less firm and solid texture, and their characteristic forms and prominences much less strongly marked. The incisors and cuspids of the lower jaw are of the same general form as in the adult, though much smaller, the edges are more rounded, and they are not much more than half the length of the latter. The molars of the child, on the contrary, are considerably larger than the bicuspids which succeed them, and resemble very nearly the permanent molars."

"The roots of the teeth in the molars of the child are similar in number to those of the adult molars, but they are flatter and thinner in proportion, more hollowed on their inner surfaces, and diverge from the neck at a more abrupt angle, forming a sort of arch."

CHAPTER III.

Diseases of the Teeth,—Caries,—The causes of Caries,—Exciting causes of Caries,—Prevention of Caries,—Treatment of Caries.

Diseases of the Teeth.—Some people imagine the same diseases that attack other osseous structures also attack the teeth, but such is not the case, indeed, the pathological conditions of the teeth do not bear the slightest analogy to those of the bones. They are not produced by the same causes, nor can they be cured by the same remedies. There are two exceptions to this rule, viz., exostosis and necrosis.

We rely mainly upon art in the treatment of the diseases of the teeth, but in the treatment of other osseous structures, we rely chiefly upon the recuperative powers of nature—nature alone can

repair the ravages of the one, art alone of the other. Exostosis is only found in the cementum, for it is a disease common to bone and teeth, and is the connecting link as it were between dentine and osseous tissue. But diseases of the dentine and enamel form a distinct class, and require treatment altogether peculiar to themselves.

Notwithstanding the teeth act such an important part in the human economy, having functions so various and so extensive to perform, yet in many instances they are greatly neglected, and sometimes subjected to positive violence, as for example, in crushing or biting hard substances, sustaining heavy weights, suffering severe percussion and sudden extremes of temperature. Very few persons give that attention to these organs which is requisite to preserve them from injurious influences, and owing to artificial modes of living, and consequent impairment of health, this is often difficult to do. Indeed, these influences are very often not known by the majority of people, and the causes of disease of the teeth are not sufficiently examined.

Such is the truth, to a great extent, in regard to *caries*, though this disease is generally the result of conditions well understood, and as this disease attacks the teeth more than any other, it will claim our first attention.

Caries of the Teeth.—Caries of a tooth is the chemical decomposition of the earthy salts of the affected part, often, but not always accompanied by the disorganization of the animal frame-work of this portion of the organ. It is sometimes so treacherous in its attacks, and rapid in its progress, that every tooth in the mouth is doomed to decay, before even its very existence is thought of. Its presence is generally indicated by an opaque, or dark spot on the enamel, and if this be removed, the dentine which underlies it will show a dark, dark-brown, or whitish appearance. It most commonly commences on the outer surface of the dentine of the crown, beneath the enamel, at some point where it is imperfect, or has by some means been injured, from thence it proceeds to the centre of the tooth, getting broader in circumference until it reaches the pulp itself.

If the diseased part is of a soft character, the enamel after a time breaks in and shows the effects of the disease on the underlying dentine, but this is not always the case, for the form of the tooth sometimes remains perfect until its whole interior structure is destroyed. Nor is any portion of the crown or neck of a tooth exempt from this insidious disease, yet some parts are more liable to be attacked than others, as for instance, the depressions on the grinding surfaces of the molars and bicuspids, or, in short, in any place wherever any imperfection of the enamel exists. Notwithstanding the hardness of the enamel (for it is a great deal harder than dentine), and considering it is less easily acted upon by the causes that produce caries, yet sometimes it is the first to be attacked, and when this is the case, the disease shows itself more frequently on the labial or buccal surface than on any other situation. Erosion is the name given to the disease when the enamel is first attacked.

After the crowns and necks of the teeth have been destroyed, the roots often remain firm in their sockets

for many years, thus showing that they are not so liable to decay as the crowns, but nature, as if conscious that the former are of no further use, endeavours to expel them from the system by the gradual wasting and filling-up of the sockets. After this they are often retained in the mouth for months, and even for years, by their periosteal connection with the gums.

Some teeth are more liable to decay than others, those that are well formed, well arranged, and of a firm texture, seldom decay, and even when attacked by disease, its progress is very slow; on the contrary, those that are ill formed and of a soft texture are attacked first, and the progress of the disease is very rapid. In a word, "just in proportion as the dentinal structure is hard or soft, the shape of the organs perfect or imperfect, their arrangement regular or irregular, so is their liability to caries diminished or increased."

The Causes of Caries.—There is much diversity of opinion concerning this disease, some think that "the disease is chiefly the result of the action of chemical

agents, such for example as vitiated saliva, the putrescent remains of particles of food lodged between the teeth or in their interstices, acids, and a corrupted state of the fluids conveyed to these organs for their nourishment. Others think that certain states of the general health, mechanical injuries, sudden transition of temperature, &c., conduces to the disease." But it would be out of the province of this little work to investigate all the various opinions promulgated concerning the causes of caries; suffice it to say, that the causes of caries may be treated under two general divisions—predisposing and exciting. Of the predisposing causes some are original and others accidental. The original development of the constitution may be defective either from original or accidental defect in the parent, but more certainly from the former; constitutional characteristics are able to be transmitted from one to another, and a defect is just as likely to be hereditary as anything else. Sometimes the teeth of the child will exhibit the peculiarities of the mother, and sometimes of the

father, and when this is the case, it will be found that the same class of teeth decay at the same point and also about the same age as in the ancestor. If such be the case, the defect is manifestly hereditary, it cannot be accidental. Hereditary taint, then, may be regarded as a predisposing cause of caries.

Another predisposing cause is impaired vitality, not only impaired vitality of the teeth, but also that of the general system. Indeed, the vital vigour of the teeth depends a good deal upon that of the general healthiness of the system, so that when the system is in the most healthy condition, the teeth is possessed of the greatest power of resisting deleterious agencies. This resisting power is but very limited at the best, but its weakness is somewhat compensated by the peculiar structure of the teeth, which is less liable to decomposition than any other part of the body. A dead tooth will decay far more rapidly than a living one in similar circumstances, and hence the conclusion that vitality resists injurious agents, and the resistance will be proportionate to the vitality.

All kinds of fever promote and hasten on decay, and this it does often in two ways—by lessening the vitality, and changing the secretions of the mouth, so that they act injuriously upon the teeth. Inflammation of the dentine generally accompanies such conditions, and when this is the case, the dentine partakes of the general disorder and becomes very susceptible of injury; indeed, all diseases that impair the vitality, and change the secretions, may be considered predisposing causes of decay.

There are other predisposing causes of caries, and amongst these may be classed some medicinal agents. All mercurials produce a bad effect on the teeth by vitiating the secretions, producing an abnormal condition of the periosteum about the roots of the teeth, the mucous follicles, and the salivary glands. Sudden changes of temperature have a bad effect upon the teeth, for they are not able to endure sudden extremes of heat or cold the same as the surrounding parts.

Exciting Causes of Caries.—Any of the exciting causes act with greater vigour when there is pre-

disposition to caries. Teeth that are well constituted, and that have impaired vitality, withstand influences that in less favourable circumstances destroy them in a very short time. The immediate causes of decay is the action of agents chemically upon the teeth. These agents have several sources, such as vitiated secretion of the mouth, saliva, and the mucus, also, abnormal secretions from the stomach, decomposition of animal and vegetable substances in the mouth, acids taken with food or administered as medicine, and lastly, galvanic action.

Sometimes the secretions of the mouth are entirely acids, and thus these natural products, which are designed for good, become so irritated that they are the means of a great deal of mischief. The healthy and natural state of the mucus is acid, but that of the saliva is alkaline, so that the one may counteract the other; but when the mucus and saliva are both acid, as sometimes happens, then the teeth of course must suffer. These secretions may also become vitiated through the inability of the glands from disease, or enfeebled condition to perform their functions

perfectly, or the blood may be in an unhealthy state, and on that account the glands may be unable, though they were healthy, as seldom occurs in such a case, to make healthy saliva; where the fountain is corrupt, the stream cannot be pure. Thus we see that anything that produces an unhealthy state of the blood, tends to destroy the teeth.

When the stomach is irritated, the gastric fluid becomes deranged so that it cannot perform its functions correctly, and fermentation of the food takes place, evolving agents that injuriously affect the teeth. Persons troubled with dyspepsia often bring these agents into contact with the teeth by eructation and vomiting, and the diseased gastric fluid, which contains a large proportion of hydrochloric acid, is also brought into contact with them and acts upon them with great violence. The teeth will be found croded over all their surfaces after food, commingled with this, secretion is ejected from the stomach. If the teeth are not of a superior structure in such cases, they are destroyed in a very short time, because when their surfaces are thus

roughened they afford a lodgment for foreign substances on all parts.

However, the decomposition of animal and vegetable matter in the mouth are the most common agents that injure the teeth; by this process elements are eliminated which form new combinations, and these operate as refined instruments in the destruction of the teeth. The conditions of the mouth are favourable for such decomposition and combinations, for the mouth contains heat and moisture sufficient, and both of these hasten on the action of the acid upon the dentine. The decomposition of foreign substances in the mouth will be very much regulated according to the character of the saliva and mucus. If these secretions are both acid, the decomposition will be much accelerated and more powerful in its effect.

There are acids taken with our food which have a deleterious effect upon the teeth, such as acetic acid or vinegar. Acetic and citric acids corrode the enamel very much; indeed, so much, that in forty-eight hours it can be easily removed by the finger-

nail; and malic acid, or the acid of apples acts very speedily upon the teeth. In the use of some kinds of food these acids are used, and consequently come into contact with the teeth. Sulphuric acid is often employed in the manufacture of vinegar, so that in this article of food we have that acid either alone, or combined with the acetic, the former acting with greater energy upon the teeth than the latter. When we eat apples containing a great amount of malic acid, we find the teeth corroded all over their surfaces. This acid, as well as the others, affect the enamel in some degree, and although it may not all be removed from a particular spot, yet its integrity will be destroyed so that it may be more readily fractured, and if this were the case, injurious agents would be allowed to come in contact with the dentine, which is much more susceptible of injury from acids than the enamel. Parts imperfectly covered with enamel are violently attacked by acetic, malic, and sulphuric acids. These agents produce rapid results in decayed cavities. They should on this account be avoided as much as

possible, and when necessarily used, the teeth should be cleaned with great care.

Prevention of Caries.—I have said a good deal about the *causes* of caries, as they are comparatively little known amongst people generally. The means of prevention are simple, and are in the hands of the most humble, if they would only take the trouble of paying attention to a little practical instruction. If the teeth are well formed and well arranged, all that is necessary is to wash them clean, at least once a-day, and do not be sparing the use of the brush. If they be very closely arranged, a good thing is to pass a waxed floss silk thread between them, this will relieve them of any little pressure that may be upon them, and at the same time will take away any particles of food that may be lodging between them; these particles when they become decomposed cause the destruction of the enamel, and consequently the dentine becomes exposed, which is one of the principle causes of caries. People cannot be too careful about keeping their teeth clean, and should sometimes use a little dentifrice, which

would have the effect of removing any stains or discolourations that may happen to be on the enamel; by these means a great deal of trouble and vexation may be avoided, and likewise many diseases may be prevented.

Treatment of Caries.—The treatment of caries depends altogether upon the nature and extent of the disease. If its progress be rapid, then more prompt and energetic measures must be resorted to than if it were slow, for the remedies that would suit the one would not be well adapted to the other. Sometimes we find teeth where the disease has but little developed itself, and are very apt to come to the conclusion that its progress may be easily arrested by the removal of the diseased part, and finely polishing the dentine, and yet, after a while decay makes its appearance at the very same part, and sometimes at another portion of the tooth altogether, and this I have known it to do four or five times in the same tooth; in cases such as this it requires all the skill and ability that the operator possesses.

When caries is superficial, it may be often remedied and removed by cutting the diseased portion away, dressing it with a fine file, polishing with rotten-stone, and then applying the burnisher thoroughly to the part operated upon. To prevent a recurrence of the attack, great attention to cleanliness is requisite. This treatment can only be applied to the proximal surfaces, but in the depressions of the masticatory surfaces of the molars, and on the labial surfaces, this method cannot be employed.

When the dentine becomes exposed, it very often gives warning of the threatened decay on account of its acute sensitiveness, and it does this sometimes before there is any outward indication, thus showing that there is some irritating agency at work, causing and promoting decay; when this is the case strict and prompt attention should be paid, so that the acute sensitiveness may be subdued by the applica-cation of some lotion containing an alkali, which would have the effect of counteracting the exciting influence. But although this may allay the pain at the time, yet it cannot be relied upon to prevent permanently the progress of the disease.

CHAPTER IV.

Deposits upon the Teeth—Tartar—Method of removing it.

DEPOSITS upon the teeth go under the general name of *tartar*, which implies all calcareous formations from the saliva, and is more or less abundant in every person's mouth. There are several varieties of this substance, the more obvious of which have reference to colour and consistency; there are all shades of colour from white to a jet black, and there are all degrees of consistency from a thick gummy mucus to the density of the dentine itself. Generally speaking, the colour will be indicative of the density —the lighter the shade the softer the consistency, and on the contrary, the darker the shade the harder the consistency.

The different varieties of tartar are composed chiefly of the same elements, viz.:—phosphate of lime, fibrin, fat, and animal matter being found in them all, though in various proportions; in fact, it is different in every person, according to their various temperaments, and no two analysis are found exactly alike.

Berzelius found it to contain 100 parts—

Phosphate of lime and magnesia,	79.0
Salivary mucus and salivine,	13.5
Animal matter, - - -	7.5
	100.

Where this substance is found upon the teeth the saliva has a decided alkaline character.

This deposit is to be found on the teeth in different parts of the mouth, but it is found in greatest quantities in the vicinity of the orifices of the salivary ducts, and hence it is found most abundant on the inner portions of the inferior-anterior teeth, and on the buccal surfaces of the superior molars. It is often found abundantly upon the external sur-

faces of the inferior front teeth. The necks of the teeth are the parts to which it attaches itself first, just at the margin of the gum and at the termination of the enamel. Once it gets a nucleus formed, it goes on till it reaches the crown of the tooth. The reason why it is deposited first and most abundantly at the necks of the teeth, is, that it is here the saliva first comes in contact with these organs, and at the same time remains here longest and in the greatest quantities. There is a great diversity of opinion concerning the source whence this tartar is derived, but it is evident that it comes from the salivary glands, from the very fact that it is found collected upon the superior molars, just in the very neighbourhood of the orifices of these ducts, where the saliva could not remain for any considerable period of time by reason of the position, but must very soon pass along the teeth nearest, on which we generally find a much smaller quantity deposited; indeed, this calcareous deposition is found in the salivary glands.

Tartar, of itself, is not directly injurious to the

teeth, but is hurtful to those parts immediately in connection with them, and upon which they depend for support. Having attached itself to the neck of the tooth, it begins to affect the gums and alveoli, and causes a shrinking in of these important surroundings, and as they become absorbed its attacks are accelerated. All constitutions are not affected alike, for in some the process goes on without any annoyance, while others suffer pain the most acute, either by irritation, inflammation, and even suppuration of the gums take place. Nor does it always confine itself to the gums alone, but the mucous membrane and the dental periosteum also become involved in the same difficulty; then will ensue, as a natural result, periostitis and suppuration, and thus breaking the attachment of the teeth before the surroundings are removed.

Method of removing it.—It requires but little skill to remove the tartar if suitable instruments be at hand. There are two methods by which it may be affected—the one by scaling and scraping, the other by decomposition with an acid; the former is always

preferable, for by the latter the chemical action of the acid does not stop with the decomposition of the deposit, but attacks the tooth itself. For the successful accomplishment of the operation very fine instruments of various forms, both straight and curved, are required. After having removed the thick incrustations, the surface should be scraped gently in order to entirely remove all remaining portions, and afterwards thoroughly polished with fine pumice stone, and finished by burnishing. Whilst the operation is going on, the frequent use of the tooth brush with water will be necessary, in order to cleanse the mouth of the detatched portions. Since this deposit often extends beneath the free margin of the gums, the utmost caution should be used, so that it may be all removed.

But it is an old adage, as well as a true one, that "prevention is better than cure," so we should use all the means in our power to prevent the disease, which can easily be done by using the tooth-brush vigorously every day; the morning is the best time to brush and clean the teeth, for during the night

the tartar is deposited in greater quantities than during the day. When the teeth are brushed they should not be passed over in a careless manner, as is often the case, but should be brushed horizontally upwards and downwards, in order to remove all secretions from the interstices; if this be practised regularly every day, it is not likely you will be troubled by an accumulation of tartar upon your teeth. It is really surprising how few take the least care of their teeth to keep them clean. How often is the breath so contaminated by the loathsome deposits upon the teeth, that you cannot stand beside some people, and yet all for the want of spending a few minutes daily in cleaning them.

CHAPTER V.

Irregularity of the Teeth.

It is not a common thing for the temporary teeth to deviate from their proper place in the alveolar arch, but irregularity of arrangement is often to be found in the permanent teeth, and more especially in the cuspids and incisors. The first and second molars, like the teeth of first dentition, are seldom irregular, for they very seldom encounter obstructions in their growth and eruption. The first molars being the first of the permanent set to appear, the ten anterior teeth are limited to that part of the arch occupied by the ten milk teeth, and if this space is too small, irregularity must of necessity ensue. The principal cause, then, of irregularity, is a

disproportion between the actual size of the arch, and the size requisite for the accommodation of the teeth. When this disproportion does exist, the teeth that are first erupted occupy very nearly their proper place, but those that come afterwards are generally more or less disarranged in proportion to the preoccupation of the space. Sometimes the roots of the temporary teeth are not absorbed, and consequently the permanent teeth are erupted out of their proper position even when there is room enough for them, were the former removed. It is generally the front teeth that are irregular in their formation, and consists in either an inward or outward inclination, and in some instances both. Sometimes the incisors are turned round in the socket, so that the edge stands at a very considerable angle with the true position. The upper teeth are oftener disarranged than the lower ones, though the latter frequently exhibit some irregularity in front, in consequence of a crowded condition. But the teeth most liable to be out of position are the

cuspids. These are the last in their eruption, and it happens that the arch is pretty well filled when this is the case, they are thrown outward. In all cases irregularity predisposes the teeth to disease and decay, but it is strange that the crowns of the teeth are not deformed by a crowded condition. The principal cause of the liability of irregular teeth to decay, is the facility they furnish for the lodgment of foreign substances about them, and the difficulty they represent to its removal. And again, in irregular teeth, parts are approximated that nature did not intend should be brought in contact. Irregularity impairs the speech, impedes the mastication, and often distorts the countenance and deforms the features.

CHAPTER VI.

Atrophy of the Teeth: Its Causes and Treatment.

THIS peculiar disease is less frequent in its occurrence than any other to which the teeth are liable, and hence it has not occupied the attention of Dentists so much as the more serious diseases, for it has scarcely been deemed of sufficient importance to merit serious consideration.

This affection has, for its characteristics, defective spots on the enamel, white and chalk-like, and which scarcely ever penetrate the dentine. There is nothing in these spots of that organic structure which is exhibited by well formed enamel. In all cases they are quite small, but vary greatly in number. They are generally found arranged in trans-

verse rows across the tooth affected. The front upper teeth are attacked by atrophy only on the anterior surfaces. The superior incisors are most frequently found with it, though the bicuspids and molars sometimes exhibit it. Instead of the spots, sometimes indentations run through the enamel and ultimately form transverse grooves of considerable extent upon the teeth. In many cases, where on the eruption of the teeth the spots only are presented, the organs are not injured, except, indeed, in appearance, as the spots generally retain the smooth enamel-like surface during life. But in other cases the spots are of such a soft friable texture, that they crumble out and leave little pits. These indentations or pits are sometimes existing at the first appearance of the tooth, but more frequently afterwards, being formed by the crumbling away of the defective portion.

It is usually on teeth of good structure that atrophy takes place, where the crowns are thick, short, and of a somewhat yellowish colour. Teeth that are long, thin, white, and of imperfect organiza-

tion and insufficient density, seldom or never are troubled with this disease.

The Cause.—To point out the precise cause of this disease is very difficult, but there are some facts in regard to it that are very obvious. In every case there is an obstruction in the development of the enamel at the point where the defect is, and at the time of its origination. In some cases there are, without doubt, a deficient amount and an inferior quality of the material elaborated for the upbuilding of the structure, and this is likely the case when the pits exist at the eruption of the teeth. In other instances, the material requisite may be elaborated, and yet the vital energy be insufficient to organize it, as in the case of the spots referred to. Generally speaking, the latter case is of more frequent occurrence than the former. This is shown by the more frequent appearance of the spots than of the pits. We may infer from the above that the origin of this affection is more constitutional than local. When this disease is constitutional, as it almost always is, it is dependent upon some disease in the pulp or

intermediate membrane, which constitutes the bond of union between the dentine and enamel, subsequently to the formation of the latter. But what the determining cause is of the disease, whether produced in this way by simple local irritation, or by general constitutional disturbances, I am not prepared to say.

Treatment.—The nature of this affection is such as not to admit of cure. Whatever treatment, therefore, may be applied, must be more of a preventative than curative nature. All that can be done is to mitigate the severity of such diseases as are supposed to produce it, by the administration of proper remedies. By this means their injurious effects upon the teeth may, perhaps, be partially or wholly counteracted. The only evil resulting from this affection is a disfiguration of the organs, for it seldom happens that atrophied teeth decay more readily than others. When the cutting edges of the incisors only are affected, the diseased part may sometimes be removed with a file without injury to the teeth.

CHAPTER VII.

Necrosis of the Teeth: Its Causes and Treatment.

THE term necrosis, when applied to a tooth, means the death of the entire organ. This condition is analogous to mortification in the soft parts of the system. But in the latter there occurs a change of structure, whereas in the bones, and more particularly in the teeth, there is not necessarily any change consequent on the loss of vitality, for the teeth have their organic connection with the surrounding parts, both by the external and internal periosteum and the pulp; and the crowns depend upon the internal organism for their vitality, but when this is destroyed, they are entirely deprived of vitality. This is quite evident from the total loss

of sensibility in them immediately after the destruction of the pulp. When the teeth become necrosed they differ from that of the other bones in some particulars, namely, when other bones become necrosed, the dead part is thrown off, and by a law in nature, the loss is supplied by the formation of a new bone. But the teeth are not supplied with any such recuperative power, which the process of exfoliation demands. Again, though a dead part come in contact with a living part, the one does not affect the other materially. As it has been remarked previously, that the roots of the teeth depend for their vitality upon both their internal and external connections, the former of these connections may be destroyed, without materially hurting the latter; for example, a tooth may be necrosed partially, that is vital in one part and dead in another, without immediate injury to the living portion, and without separating the living from the dead. It is a beautiful provision in nature, that the analogy between the teeth and the bones does not in this respect obtain, for if it did, what would be the result? It would be

this, that immediately after the death of the pulp, we should find the crowns of the teeth exfoliated from the roots in all cases. When a tooth becomes necrosed it is easily noticed, it loses its semi-translucent appearance and life-like lustre. Total necrosis completely destroys the entire organic connection of the teeth with the surrounding parts, in which case nature expels them from their sockets as useless.

Causes of Necrosis—Necrosis may be produced by a variety of causes, such as partial caries, protracted fever, or diseases of any kind that diminish the vitality of the constitution, the long continued use of mercurial medicines, and sometimes external violence; but the immediate cause, when not occasioned by a blow, is inflammation and suppuration of the lining membrane.

Treatment.—When a tooth is necrosed, and is the means of causing injury to the gums or the adjacent teeth, it should be removed at once, for however valuable it may be, it should not be retained at the expense of the other good teeth. When the disease

is in an incipient stage, it should be stopped if possible, and for this purpose leeches should be applied to the gums, and the mouth should be gargled by suitable astringent washes, If this plan be adopted on its first appearance, it will sometimes prevent the loss of vitality, but if it be long neglected, no favourable result may be expected.

CHAPTER VIII.

Exostosis of the Teeth: Its Cause.

THIS term, when applied to the teeth, conveys an idea of growth upon a bone. This disease is common to all bones, but it attacks no other part of a fully formed tooth than the root. It is upon the roots of teeth then that it occurs, but it is never developed where there is no periosteum, nor is the manner of its attacks uniform, but the general way is an enlargement on the point of the root, or from the point some distance toward the neck of the tooth. In some cases it entirely surrounds the root, and in others is confined to the one side. The osseous matter thus deposited, has usually the colour, consistence, and structure of the

cementum, though sometimes it is a little harder, and assumes a yellowish tinge. It sometimes results in such an enlargement of the root, more especially if near the point, that it renders the tooth difficult of removal, and indeed, in some instances, quite impossible without cutting away a portion of the process.

The density of the deposit is generally greater than the root itself, on which it is found, and the surrounding parts are absorbed for its accommodation. The rate of its formation varies exceedingly, sometimes increasing so rapidly as to cause great inconvenience, and at other times seeming to advance very slowly, and not unfrequently is its progress arrested altogether. Roots that have been dead and crownless for a number of years are often found affected with exostosis, and have never given their possessor any trouble, so far as known, on account of the affection.

This disease always increases the difficulty of removing the tooth, either by the enlargement of the point of the fang, or by deposit on one side of it,

causing it to curve, in which latter case the difficulty is all the greater, from the impossibility of determining the direction of the curve. Sometimes it produces a diseased condition of the surrounding parts —in some instances chronic inflammation—which will continue as long as the tooth remains. Nervous affections often result from exostosis, either through irritation caused by pressure on the nerve, or through the diseased condition of the surrounding parts.

The cause of this affection is not well known, but it is most probably deposited by the periosteum when in an abnormal condition, but what is the peculiar condition is not exactly ascertained, though some have supposed it to be inflammation. But it is quite evident that something more than a state of simple inflammation exists, for there is innumerable instances of inflammation where there is no deposit of this nature at all. Indeed, this subject is one in which there is room, at least so far as Dentists are concerned, for extensive and careful observation.

CHAPTER IX.

Diseases of the Dental Pulp,—Acute Inflammation of the Dental Pulp,—Chronic Inflammation of the Dental Pulp.

Diseases of the Dental Pulp.—The pulp of a tooth is confined in a bony canal, and owing to its great sensitiveness it becomes very painful when irritated. It is also highly vascular, and the vessels becoming distended press upon the nervous filaments distributed upon it, and thus the pain is aggravated by local constriction. The cause of the disease of the pulp is the exposure of the pulp-cavity by caries, or by injury of the crown of the tooth, by violence, or any other means. But sometimes sudden changes from heat to cold, or cold to heat, cause great pain,

and even the slightest pressure upon the crown or neck of the tooth produces painful sensations. It will also sometimes happen that the patient cannot use the tooth with that amount of pressure that is requisite for the proper mastication ot his food. These conditions may arise, and yet the pulp be free from injury. When such is the case, a careful examination of the tooth will show that it is either affected by caries, or a part of the crown has been destroyed.

It may happen that we may fail to discover any indication of decay in the sensitive teeth, for the cause of the pain may be in some other tooth, which, although free itself from pain, may produce sympathetic irritability in the other teeth, or it may depend entirely upon some constitutional cause. When the irritation is great, it is sometimes succeeded by inflammation, but this generally takes place in teeth where small portions have become detached without causing any injury to the pulp-cavity. When this is the case, they become, by degrees, sensitive to any change of temperature, and the pain, which at

first was of short duration, lasts longer, and latterly severe tooth-ache is caused by inflammation of the pulp. If the offending tooth is drawn and carefully examined, it will be seen that the pulp-cavity is entire, but at the same time the pulp is undergoing a process of disorganization.

Acute Inflammation of the Dental-pulp.—When the pulp of a tooth becomes the seat of acute inflammation, its capillaries can be seen distinctly, and the organ itself has a bright red colour; but when in a healthy state its capillaries are not discernable with the naked eye, and it has a greyish-white appearance. When once inflammation fully establishes itself in the pulp of a tooth, it does not confine itself to it, but extends its ravages even to the periosteum. When the pulp is inflamed, it has a tendency to expand, but owing to the nature of the bony canal by which it is enclosed on all sides, this is impossible, and the capillaries becoming distended with blood, press upon the fine nervous filaments, causing a constant gnawing pain at first, which, after some time, as they increase in size, becomes severe and throbbing in its character.

Inflammation of the pulp may be caused in various ways, such as a blow on the teeth, impressions of heat and cold conveyed to them through the enamel, or contact with irritating agents; the latter is the most common cause. When a hole is discovered in the tooth, food and other matter get into it, and are removed from time to time; these produce no sensations of pain for a time, but after a while certain other substances, such as sugar, salt, and acid matter get into it, which cause a little inconvenience only, but by and bye the pain becomes constant and positive. The foreign substances are again removed, and the pain ceases, and thus it goes on from time to time, till sooner or later the pain establishes itself, and becomes more acute and severe in its nature. Nor does it confine itself to the tooth, but extends to those adjacent, and to the side of the face. Generally the pain departs after a short period, but only to make another attack on the slightest provocation, or on the patient assuming the horizontal position. Should the diseased tooth be examined, after a few attacks of the throbbing

pain, it will be found that the pulp has lost its vitality, and is fast hastening into a state of decomposition. When such is the case, the character of the pain is altogether changed, and the throbbing pain has given place to a dull heavy one, accompanied with a feeling of tension. The inflammatory action has raised the tooth from the socket, and the patient has a feeling that the tooth is too long; the pain, after sometime, subsides, and the feeling of tenderness and elongation passes away.

Acute inflammation of the pulp is more unmanageable in its nature, and rapid in its progress, than any other organ or tissue of the body. But this is not to be wondered at, when we take into consideration its situation, the unyielding nature of the walls of the cavity in which it is enclosed, and its vital peculiarities. The same remedies that are used for any part of the body affected with inflammation, though they cannot be so readily and fully applied here, should be resorted to in the case of inflammation of the dental pulp; the first and most important of these is the removal of all local and exciting

causes, whatever they may be. If the tooth has been previously filled, the plug should be removed at once, and in order to allay the inflammation, leeches should be applied to the gum. Sometimes a brisk saline purgative is of great benefit to the sufferer.

Chronic Inflammation.—Inflammation of the dental pulp is not always acute in its nature, but sometimes assumes a chronic character. It differs from the acute form of the disease, both in its symptoms and general results. The cause of this disease is the exposure of the pulp-cavity, into which the fluids of the mouth and other foreign substances find their way, and cause increased vascular action in the exposed part; but the morbid action thus brought on is seldom accompanied with much pain. It may thus remain partly exposed for a long time, without the least inconvenience, unless sometimes now and then a smart pain may be felt when any hard substance may chance to enter the cavity, but on its removal the pain passes away. However, the pain, when it is excited, often in this manner will become

more permanent, and the oftener it is thus excited, the longer will it be of departing, even after the causes of irritation have been removed.

The more the pulp becomes exposed by the gradual decomposition of the dentine, the more readily does the tooth begin to ache, and latterly the inflammation may take an active character, and the results become quite different from those it would have assumed, had it remained in its chronic state. When this is the case, the pains are sometimes darting, lasting only for a few minutes, and then going away for a short time; at other times they become dull and aching, and last for a long time. Perfect freedom from pain, when a tooth is in the state above described, is not to be expected, and the only sure remedy is to have it extracted.

CHAPTER X.

Tooth-Ache: Its Causes and Treatment.

PAIN in a tooth is a sure sign of disturbance, which is either functional or structural, and this takes place either in the organ itself where the pain is, or in some part or parts of the body, but more frequently in the former than in the latter. The sensation of pain is so variable that it is almost impossible to describe it correctly. Sometimes it is a sort of a gnawing dull pain, causing no great uneasiness, at other times it is so acute that it becomes almost unsupportable. It may come on at first with a very slight pain, and then, as often happens, increases in severity until the pain becomes most excruciating. It often happens, also, that it comes on all at once without

the least warning whatever. Sometimes it may be confined to a single tooth, and at other times, it may affect two or three at a time. When this is the case, the patient is at a loss to know what particular one is the original offender. The pain may continue for hours, and even days, without the least cessation, at other times it may be intermittent, recurring at stated or irregular periods, and each lasting from a few minutes to one, two, or even more hours.

The Causes of toothache are about as varied as the sensations of pain are, but amongst the most frequent may be mentioned irritation and inflammation of the pulp, and also inflammation of the investing membrane. Sometimes it is attributable to a morbid condition of the nerve, or nerves, going to a single tooth, or of the trunk, from which several nerves are supplied, and very often to a derangement of the digestive organs. Dr. Hullihen enumerates the following as the causes of toothache, 1. Exposure of the nerve; 2. Fungus of the nerve; 3. Confinement of pus in the internal cavity; 4. A

diseased state of the periosteum covering the fang; and 5, Sympathy. Dr. Heilden attributes it to congestion or inflammation, or to a lesion of the nerves of the lining membrane and pulp, or of the peridental membrane.

A blow upon a tooth may produce inflammation of the lining membrane and pulp, or cold communicated through the enamel and dentine, or as sometimes happens through a metallic filling, but it most frequently happens by contact of irritating agents, such as particles of food, acrid humours, and other irritating external substances. But inflammation is not always necessary to produce pain, for it may be produced when inflammation does not exist at all, and when this is the case it generally subsides soon after the irritant is removed. The pulp of a tooth may be exposed for a long time, and often subjected to the contact of foreign substances, and yet may not become the seat of inflammatory action; when this is the case, the pain is seldom of long duration, although it comes on in a moment, and the pain is of the most excruciating character.

On the contrary, when inflammation does exist, the pain is more constant, although at first it is of a slight gnawing kind; but after a time it assumes a different character, first throbbing, and if not quickly arrested in its progress, increases in severity. The pain is not increased by pressure on the tooth, so long as it is confined to the parts within the pulp-cavity. You may easily discover the exact locality of the inflammation, by the fact that ice or cold water, when applied to the tooth, causes the pain generally to subside. But the inflammation does not confine itself to the interior of the tooth, but very soon finds its way to the periosteum of the root and its socket.

When the pulp becomes inflamed, the pain is very severe, and is, doubtless, caused by the swelling of its vessels, and the unyielding nature of the walls of the cavity in which it is placed prevents it from expanding. In this manner its capillaries become distended, and of course must press upon the nerves which are distributed through it. This causes that peculiarly painful throbbing sensation, which is the

characteristic of this variety of toothache. Hence, whatever increases the action of the heart and arteries, augments the pain. It is also more severe during the night, than the day, while the body is in a lying position, for this position gives greater fullness to the arteries of the head; but very much depends upon the condition of the tooth, and the habit of the body of the patient. Every part of the pulp and lining membrane is affected when the inflammation is acute, and the pain occurs more frequently before than after these tissues have become exposed; when this is the case, it generally ends in suppuration. Chronic inflammation may exist for a long time without causing any pain, and is usually caused by the partial exposure of the pulp, but the pulp, when thus affected, is more susceptible of injury either by heat or cold, and the liability of the tooth to ache is greatly increased.

When pus is confined in the cavity of the tooth, as is very frequently the case, the pain is felt only when hot or cold liquid passes over the affected

tooth; but, by degrees, a gnawing pain comes on, the tooth becomes sore and tender, seems a little loose and longer than the others, and pain darts from it along the nerves to the forehead, the ear, the side of the head, and to the neighbouring teeth in both jaws. When this happens, it is about to suppurate, but when it appears elongated, loose, and very sore, the nerve *has* already suppurated, and the pus is oozing from the end of the fang where the vessels and nerves enter. Sometimes the cheek begins to swell, and when this takes place, it is a sign that the matter is spreading between the alveolus and its lining membrane, and this is the cause of the throbbing pain that is felt during the formation of alveolar abscess.

Pain, however, may exist, the nerve may suppurate, and the face swell, and both the pain and swelling go away without the formation of abscess; in this case, the matter has worked its way between the end of the fang and its membranous covering, and there forms a sac about the size of a pea;

in the course of time this sac will burst, and discharge its pus between the fang and the alveolar process.

Toothache often arises from inflammation and thickening of the membranous lining of the end of the fang, and generally resulting in the formation of pus; when this takes place, the pain is confined to the tooth, the nerve of which has suppurated, and caused alveolar abscess. In these cases, the primary causes of the disease are suppuration of the nerve and formation of an abscess. Generally the pain is dull and heavy, the tooth becomes a little sore and loose, and the gums assume a bluish colour; but if the pain becomes throbbing, then matter is in the course of formation, the gums become turgid, and the result is what is commonly termed a gum-boil.

Fungus of the pulp is a small tumour of a deep red colour, either in the canal of the fang, or else in the cavity of the crown, which it generally fills when present there. It varies in size from a pin head to a large pea, is very soft, and bleeds freely

on the slightest touch; it is sometimes quite insensitive, at other times quite the contrary, but the pain which it occasions is not of that darting throbbing character, which usually accompanies the real affections of the nerve. It has one characteristic, however, that is of rendering the breath offensive and disagreeable. This form of the disease may be removed by lunar caustic, which, if applied repeatedly will destroy the diseased part, and temporary relief may be had by puncturing the fungus, and thus causing it to bleed freely, but extraction is the only permanent and effectual cure.

It is difficult to account for that peculiar pain called toothache. "It appears," says one who has had a good deal of practice as a Surgeon-Dentist, "to consist in the circumstance, that the dental vessels and nerves are confined in bony canals, which during inflammation do not admit of vascular congestion without producing severe compression of the nervous fibres. In this way we can account for the fact, that conditions which increase the vascular action of the system, are very apt to be attended

with toothache. In pregnancy, it is well-known that the blood, when drawn, exhibits the characteristic buffy coat of inflammation; in pregnancy, therefore, toothache is a very common affection. With respect to the cause of pain, the teeth follow the same law as many other organs—as the ear, the bones, generally, &c.,—in which the distress is generally pretty nearly proportional to the unyielding nature of the parts. In this way it happens, that structures that are least vital or sensitive in health, become the seat of agonizing pain during inflammation, which tends to expand them violently, according to the laws of the pressure of fluids."

Treatment.—When the nerve of the tooth is exposed, the treatment must be something that will mitigate the pain, such as the essential oils, mineral acids, creosote, &c.; to benumb or destroy the sensibility of the part, care must be taken in using them, for in some cases they may do mischief. I have found the terchloride of carbon with morphia, or a mixture of creosote and morphia, made into a paste with finely powdered gum-mastic, and applied

to the nerve on a small piece of lint, of great benefit in alleviating the pain; also, chloride of zinc, tannin, and tincture of galls have been used beneficially, but their effects are not so certain as the first mentioned.

When the pain arises from acute inflammation of the pulp and lining membrane, the tooth must be extracted, the pulp destroyed, or the inflammation subdued. This last method can seldom be done unless where the decay has not reached to the pulp-cavity. Whether the tooth should be drawn or not depends upon the amount of pain, the progress of the inflammation, and the situation and importance of the tooth. It is the duty of the Surgeon-Dentist, when a patient desires to have a tooth extracted, first of all to examine it carefully, and if he considers it can be kept in by any means in his power, to do so, but if not, let it be drawn at once, as there is no use of prolonging the suffering of the patient.

CHAPTER XI.

A Comparative View of the Teeth of Man and Animals.

THERE are various marks by which the human race can be distinguished from the brute creation, and perhaps there is none more so than the perpendicular arrangement of the front teeth of the lower jaw. It is true that in some respects the human teeth resemble the lower animals, but the structure of the chin shows that the erect posture is natural to man only. The teeth of the human being are of a uniform length and continuity of series, but this is not the case as regards other animals, for according to the wants of the animal, the canine teeth are of a greater or less extent than the others. Animals use their teeth as weapons of offence or defence, or as instruments for procuring food, but the hand of man

superseeds the use of teeth for these purposes.

If we compare a human skull, in which the dentine is perfect, with that of the monkey, it will be found that, while in both cases the teeth are equal in number, in the monkey the lower teeth diverge upwards and outwards, instead of upwards perpendicularly, and that the canines are considerably longer than the others, and also longer than those of the corresponding class in man.

Again, if we compare the skull and dentine of the lion with that of man, we will find that the canine and incisor teeth are strikingly different, more particularly the canine, which, being intended in the lion to rend and tear its prey, are very strongly developed.

The sheep, on the contrary, as the representative of another class of animals, are entirely devoid of teeth in the upper jaw, indeed, we may take the whole animal creation, and we shall find the same wisdom displayed throughout, and thus proving without doubt, that the teeth of all animals are well adapted to their several wants, habits, and necessities.

CHAPTER XII.

The Value and Importance of the Teeth, as regards Health, Comfort, Personal Appearance, &c.

It is necessary before the food is taken into the stomach that it be broken up into small parts, and mixed with a portion of saliva, in order that it may be regularly and thoroughly exposed to the action of the gastric juice. The teeth, then, are the instruments used for breaking up the food into the requisite small portions, so that it may be easily digested by the stomach; the importance of this process will be better illustrated by comparing the human teeth with those of the different classes of animals that feed on vegetable matter, whether they be graminivorous, herbivorous, or both.

Let us take the cow for example:—Nature has endowed this animal with more than one stomach, or receptacle for food, and as it eats quickly, the stomach, into which the food first enters, has the power of returning it to the mouth, there to undergo a second and more perfect mastication, which is called rumination, or more commonly, chewing the cud. When this is done, the food is ready and fit for entering into the true stomach, where its conversion into nourishment commences.

The incisors of animals of this class are thin and sharp, which enable them to crop the shortest grass, and fill the stomach hastily, at the same time, the molars have large surfaces for effectually grinding the food when submitted to their action. Now, the provision that nature maintains for animals, cannot be impaired in human beings without interfering with their bodily health and comfort. Man has as much need for perfect mastication as animals, and as this depends upon the teeth, it is surely his duty to see that they are kept in a healthy and sound condition. The food

cannot be properly masticated, or perfectly mixed with the saliva when the teeth are imperfect, and the consequence is, that the sense of taste is very imperfectly exercised upon the nutritious materials, when yet this sense is in a manner stationed as an outward guard over the whole series of the digestive organs. Every-day experience teaches us, that as long as objects remain of a certain size, they are accountable only to the sense of touch, but not to that of taste, which requires a minuteness in its objects before it can relish them. Food, when taken into the mouth, is hardly tasted at all before the teeth comes into contact with it, and there it yields its taste just in proportion as the teeth act upon and reduce it; in so far as solid bodies are concerned, the analytic operation of the teeth is necessary for gustatory sensation. The operation, therefore, of breaking up the food in minute parts, is one of the highest administrative offices that the teeth perform in the animal economy, without which, the food would enter the stomach in gross morsels, and this would

give rise to many evil consequences, such as indigestion, and all its attending evils. If the teeth are imperfect, the mastication will also be imperfect, and consequently the digestive process will not be perfectly performed.

The teeth do not only enable the food to become an object of the sense of taste, but they themselves are the transmitters of a fine and peculiar sense of touch. We are sometimes painfully made aware of its existence, by small pieces of sand, cinders, little stones, and the like, coming between the grinding surfaces of the teeth.

No one will dispute the fact, that the perfection or imperfection of the teeth makes a great difference in the appearance of the person. See how the symmetry of the whole mouth is marred if one of the front teeth are awanting, but if the whole of these organs are gone, and the alveolar processes absorbed, two or three inches are taken from the face, and the nose and chin approach each other. The skin, also, gets into deep furrows, the cheeks protude, and the mouth loses

its bewitching smile, altogether, the face becomes old like and deformed.

Again, the teeth are as indispensable for articulation, as are the lips and tongue, which act in unison with the teeth in speech; many of the sounds of the human voice are produced by the vibration of the tongue as it strikes against the teeth. Indeed, some of the letters of the alphabet cannot be pronounced correctly if the front teeth be wanting. The reader can easily verify this if he pronounce the words "thin," "those," "that," "theory," &c., and he will perceive the vibratory motion of the tongue against the teeth, also the manner in which the lips modulate the sound, and give it definite expression. Persons who have lost their front teeth have great difficulty in pronouncing some words, and when they do pronounce them, have a peculiar lisping sound.

And not only do the teeth contribute to the articulation of the voice, but they also transmit the voice to the ear of the individual uttering it; they also give a loudness and distinctness to the sound, as

apprehended both by the internal and external auditory passages. This can be proved in many ways, for instance, if you hold a poker between your teeth, having previously closed your ears, and applying the other end of the poker to a boiling kettle, then the sound of the ebullition is conveyed through the teeth to the ear and head with the greatest distinctness. Now, we conclude from this that whatever sounds strike upon the teeth, they are at once conveyed to the ear. Disagreeable sounds are said to "set the teeth on edge." Some people cannot bear to hear certain disagreeable grating sounds, such as a shovel going over cinders, &c., which show that the teeth perform some offices as transmitters of sound.

There are no organs of the human body that perform so many useful offices, that are so much despised and neglected, as the teeth; they perform, by the breaking up of the food, what may be called the first digestion, which is necessary before the food enters the stomach; they bestow grace and beauty to the female countenance, and impart a firmness and man-

liness to the male, and not only do they give beauty to the face, but they are beautiful in themselves, both in form and colour; they have been often likened to pearls, alabaster, and spotless ivory, but their uses are of a higher character still, for they assist in forming speech, which is the distinctive characteristic of man, and thus they stand in that series of mechanism which brings the intellect into physical expressions, and enables man to communicate to his fellow-man the truths which he may have conceived in his own mind; they also assist in giving the speaker a clear hearing of his own voice, and enable us to acquire intonation, and the utterance of our thoughts with the greatest perfection.

From the mere fact that the teeth perform so many varied and useful offices, it would have been expected that they would be more valued and better taken care of than they generally are, but how few take the least care of them whatever, and it is the fewest number that even take the trouble of keeping them clean.

CHAPTER XIII.

How the Teeth may be Preserved.

FEW persons are induced to become acquainted with the means of preserving the teeth, or if they do so, they seldom take the trouble of following up the means thus acquired with that diligence and perseverance which are necessary to success, they may perhaps take the trouble of using the brush once a day, and are quite satisfied so long as the teeth go on performing their duties, but they take no trouble whatever in order to prolong their valuable services, or to prevent them from falling into decay. It often happens, also, that a dentifrice is used which makes the teeth white, but it is at the expense of toothache and decay in time to

come. Were people to take ordinary precaution for the preservation of their teeth, and were they convinced of their real value, a large amount of suffering would be avoided, and many teeth would last during life, which are at present lost through carelessness.

Many a valuable tooth is lost on account of the patient not applying to the Dentist in time, for it too often happens that nothing short of actual pain will compel them to seek his advice and assistance. This is very foolish, indeed, for the teeth differ somewhat from other organs, in so far, that disease may have been going on for a long time before the pain is felt. The patient is not alive to the ravages that are going on so long as the disease is confined to the enamel and bone, and probably not until the bony substance is destroyed, and the internal cavity of the tooth becomes exposed, is his attention called to the subject.

Children should be early taught to take great care of their teeth, and at an early age, say six years old, they should be taught to use a tooth-

brush; this brush should be used at least once a day, and as the double teeth make their appearance in the mouth, particular attention should be paid to their grinding surfaces, for their unevenness often causes them to retain particles of food, and consequently they become liable to decay. The brush for these teeth should be rather hard, having long elastic bristles, and after every meal it should be used to remove any remains of animal or vegetable matter before decomposition commences. Particles of food, and deposits of tartar, are very apt to lodge between the lateral edges and posterior surfaces of the teeth; therefore, to cleanse the parts thoroughly, the brush must not only be moved across the teeth, but upwards and downwards, confining the action to no particular place. In using the tooth-brush for the posterior surfaces of the incisors and upper centrals, the interstices between them should be carefully cleaned. Some people think that this process removes the gums from the necks of the teeth, but nothing could be more erroneous. The fact is, that when the gums

are relaxed, spongy, and liable to bleed, the above is the best means for restoring them to healthy action, and causing them to adhere more firmly.

There are various kinds of dentifrice recommended for cleaning the teeth, but some of them should be used with caution. The following are highly recommended, and have the quality of being free from any deleterious mixture, viz.:—quinine, dentifrice, camphorated chalk, or a powder composed of the following ingredients—

Orris root, - - - - -	¼ Ounce.
Gum myrrh, - - - - -	¼ Ounce.
Nutmeg, finely powdered, - -	1 Scruple.
Chalk, - - - - - -	1 Ounce.

Mix well.

The best time to use these tooth-powders is in the morning; sometimes the gums should be brushed with a little spirits of camphor or eau-de-colonge, after the teeth are cleaned.

If it be necessary to use a tooth-pick, be sure and not use a metallic one, the best are those made of

quill, and are to be had at the stationers' shops.

Thus, we see, that the means of preserving the teeth from disease and decay, are few, simple, and inexpensive, yet, if they be honestly and perseveringly acted up to, they will be found most efficacious. In fact, one word embraces the sum and substance of all remedies, and that is—cleanliness.

CHAPTER XIV.

Artificial Teeth,—Various kinds of Artificial Teeth.

Artificial Teeth.—Notwithstanding all the care of the patient, and every effort of the Dentist, the teeth sometimes prematurely decay, and are lost. Nor is it surprising that their loss should be considered a sad affliction, as with their loss, beauty, expression of countenance, correct enunciation, and facility of mastication, which is so necessary to health, are more or less affected. What then is to be done under the circumstances? Is it in the power of the Dentist to furnish a substitute for these invaluable organs? Yes, we answer, there is a remedy against the annoying and serious consequences arising from

their removal from the mouth, and this grand result is to be found in artificial teeth.

But, at the same time, it is but right that the patient should be told, that under no circumstances whatever, can the artificial teeth be so useful as the natural ones, for there is a perfection in nature that never can be arrived at by art. However, when they are properly made and adjusted, they can be worn without the slightest annoyance, and after they are a day or two in the mouth, the patient is scarcely conscious of their presence. There are difficulties to encounter, which none but an experienced Dentist has any idea of, connected with the insertion of artificial teeth, for they must be constructed and applied in such a manner that they can be easily removed and replaced by the patient, and at the same time, must be firmly secured in the mouth, and care must be taken that they do no injury to the parts to which they are in relation. Indeed, the perfection of artificial teeth depends, first, upon their being so skilfully adapted to the mouth that they may be worn with perfect ease and

convenience; and secondly, on the manner in which they are fastened in the mouth, for it not unfrequently happens that the ligatures used to fasten them loosen and destroy the adjacent teeth; and care should be taken of the suitableness of the materials employed in their construction, for improper material causes a variety of diseases of the gum. Again, the adjustment of the teeth must be such as will give solidity and firmness, and they must be so adapted as will prevent the lodgement of food between the artificial material and the gum. If this be not the case, a taint would be given to the breath.

Having shown the conditions upon which the success of artificial teeth depend, we will now proceed to enumerate the various kinds that are generally employed.

In artificial teeth there are two qualities which it is very important that dental substitutes should possess, viz.: There appearance should resemble, as nearly as possible, the natural organs with which they are to be associated.

The following kinds of teeth have been used, viz:

1. Human Teeth.
2. Teeth of neat cattle, sheep, &c.
3. Teeth carved from the ivory of the elephant's tusks, and from the tooth of the hippopotamus.
4. Porcelain teeth, also called indestructible teeth.

Human Teeth are preferable to any other as regards appearance, and this itself is of great importance, but when used they must be of the same class as those they are intended to replace. Their durability depends upon their density, the soundness of their enamel, and the condition of the mouth in which they are placed. If the density of their texture be great, their enamel perfect, and the mouth in a healthy condition, they may last eight or ten years, but, in the majority of cases where artificial teeth are required, the secretions are so vitiated, and of so corrosive a nature, that they do not last above two or three years. However, it is very seldom that human teeth are used, and when they

are thus applied it is only in particular cases.

Teeth of Cattle.—The teeth of neat cattle stand next in order to the human teeth as a dental substitute, and after them, perhaps, are the best. They can only be used for the incisors of some persons, by slightly altering their shape, but they are by far too glossy and white to correspond closely to the human teeth, and even although there were no other objections to their use, the contrast which they make with the other teeth would be a very serious one. Dentists, sometimes, too often disregard this imitation of nature, and, perhaps, the reason is, they are too apt to comply with the desire of the patient, who wishes to have them as white and shining as possible. But there are other objections to these teeth, they are only partially covered with enamel, and the density of their structure is not so great as the human teeth, the consequence is they are less durable, for they are more easily acted upon by chemical agents; like the human teeth they are seldom used with advantage as a substitute for human teeth.

Tusks from the Elephant and Hippopotamus.—The ivory from the tusks of both these animals have been used for artificial teeth from a very remote period; we are not to suppose from this that they are the best substitutes for human teeth, or even good, for of all substances known to have been used, they are most objectionable. The ivory of the elephant's tusk is less dense than that of the hippopotamus, and in a few hours, even teeth formed from it become completely saturated with the buccal fluids, and when decomposition takes place, it causes the breath to be exceedingly offensive and disagreeable. The teeth from these substances are easily formed, but having no enamel they very soon turn dark in their appearance.

Porcelain, or, as they are sometimes called, Incorruptible Teeth.—Of all the various substances used for artificial teeth, those made of porcelain are the best, they possess many advantages over all other artificial teeth, they neither decay nor change, nor are they in any way affected or acted upon by the jucies of the mouth or by acid medicines, and, more-

over, they are most enduring, and worn with great convenience. They do not taint the breath if proper attention is paid to their cleanliness, nor are they acted upon by chemical agents, and hence they have received the name of incorruptible. They are nearly the only teeth used by Dentists at the present time.

CHAPTER XV.

The Gums and some of their Diseases: Their Treatment.

THE appearance of the gums vary according to the general state of the health, and sometimes according to the condition and arrangement of the teeth; for instance, a loose tooth, or a small deposition of tartar upon the teeth, will not cause much annoyance to a person of a sound constitution, but if the person be of a scorbutic habit, the gums will appear of a dark purple colour all round the place affected, they will also appear swollen and flabby, and withdraw from the necks of the teeth; lastly, they will ulcer, and the slightest injury will cause them to bleed, sending forth a disagreeable smell.

But although the gums depend a good deal upon

the condition of the health, yet, they are sometimes affected with inflammation even in persons possessed of a good sound constitution. If the arrangement of the teeth be not correct, this will cause inflammation quite independent of the condition of the health; however, it can easily be ascertained whether the disease is local or constitutional.

Dr. Harris, in his valuable work on dental-surgery, says, "in the most perfect constitutions, and during adolescence, the gums present the following appearances:—they have a pale red colour, a firm consistence, a slightly uneven surface, their margins form along the outer surfaces of the dental circle beautiful and regular festoons, and the mucous membrane, here, as well as in other parts of the mouth, has a fresh, lively, roseate hue." But, on the contrary, if the gums are diseased from the constitutional effects of mercury, scrofula, or scurvy, their appearance is quite different, for then they assume a dark purple colour, are very sensitive, and become exceedingly painful on receiving the smallest injury. When in this state they unerringly point

out the state of the constitutional health. Some medicines that are used as curatives for other diseases have a powerful effect upon the gums, as when mercury, for instance, is administered; then they become to the Physician a perfect guide to show him to what extent that agent has affected the constitution. Tomes, in his "System of Dental-Surgery," says, in speaking of the effects of mercury on the gums, "In salivation produced by mercury, the effect is first discernable upon the gums some hours previous to the occurrence of the metallic taste, and to the fetor of the breath, and also soreness and discomfort of the mouth, which mark the influence of mercury on the system; the gums show indications that these conditions are about to appear—that the patient will in a few hours be salivated. The state of gum I am about to describe is, in fact, a premonitory sign of ptyalism, for should it appear, and the mercury be immediately discontinued, yet salivation will come on. The sign is this:—the adherent portion of the mucous membrane of the gums assume an opaque white colour, contrasting strongly

with the non-adherent portion, which preserves its natural hue or becomes more red. The free edge of the gums is moveable, but that part which lies over the edge of the alveoli is firmly tied down to the periosteum, and as the edges of the alveoli present a festooned line, so the whitened mucous membrane presents corresponding undulations. Again, where the mucous membrane is loosely reflected from the gum to the cheek, the natural colour is preserved. The whiteness of gum is produced by an increased secretion of epithelium, which, from being thicker and more opaque than in the healthy state, renders the colour given by the vessels to the subjacent tissue less apparent.

"The surface of the mucous membrane, when deprived of epithelium, is studded over with enumerable small conical elevations, or papillæ. The thickened epithelium is readily rubbed off the tops of the papillæ, while it retains its full thickness in the intervening depressions, hence, if closely inspected, the gums will not be seen to present a uniform white hue, but a mottled aspect.

"With the increased thickness there is a decrease of tenacity between the scales that form the epithelium, for the surface may be much more readily rubbed off than when in its natural state.

"This curious and useful premonitory sign of coming ptyalism, was, I believe, first noticed and its value pointed out by Mr. Corfe; at all events, he first of all drew my attention to the fact, and I am not aware that it had been previously described. Since, however, Mr. Corfe mentioned the result of his observations as to the constancy of the sign, I have verified for myself its presence in all cases of salivation that have come under my notice, and from these the foregoing account has been given."

When the gums are diseased through constitutional causes, the Surgeon, and not the Dentist, is the proper party for the patient to apply to for assistance, although the Dentist is often called upon for advice when the gums are thus diseased. However, in these cases it is evidently the duty of the Dentist to inform the patient frankly to consult some qualified Surgeon, as local remedies are of no avail, unless

accompanying or following constitutional treatment.

When the gums are affected by acute inflammation, the disease is purely local, arising usually from the irritation consequent upon dentition, carious, dead or loose teeth, and sometimes by teeth which occupy a wrong position, or are crowded in their arrangement. Chronic inflammation of the gums is generally either accompanied with suppuration, or the recession of their margins from the necks of the teeth; but this state of the disease may be going on for a long time before suppuration or recession takes place; indeed, much depends upon the constitutional state of the health, and the amount of local irritation. When the gums become inflamed, their edges by degrees loose their festooned appearance, become thick and spongy, and when pressed, matter exudes from between them and the necks of the teeth. They also bleed from the smallest injury. When this takes place, the dental periosteum is sometimes destroyed, and the teeth, having lost their support, latterly drop out.

The disease is prevalent amongst persons of all

ages, conditions, and rank, nor is it confined to any country, clime, or nation. Dr. Koecker, who has had ample opportunities of observing this disease, says, "the inhabitants of the most widely separated countries—Russians, French, Italians, Spaniards, Portuguese, English, Africans, East and West Indies, and those of the United States, to be all more or less liable to it." He also states that "persons of robust constitution are much more liable to this affection of the gums than those of delicate habits, and it shows itself in its worst form after the age of thirty, oftener than at any earlier period."

When the gums are affected by the disease described above, there is always some exciting cause present, as necrosed or loose teeth, exostosis, the stopping of a tooth, extending beyond the margin of the cavity, or some irregularity of the teeth, which favours the deposition of extraneous matters, such as food, &c.

In the *Treatment* of gums thus diseased, it is necessary, first of all, to direct our attention to the

removal of the exciting cause. It may be that there are dead or loose teeth in the mouth, or it may happen that there is tartar or some extraneous matter causing irritation. If such be the case, the first thing to be done is to carefully remove them. Of course, bleeding from the gums and sockets will take place after these operations, and this bleeding should not be stopped, but be promoted as much as possible by washing the mouth with warm water. To complete the cure, the mouth should be washed two or three times a day with some tonic and stringent lotion. The following is highly recommended by Dr. Harris:

Powdered nut galls,	- -	2 drachms.
„ Peruvian bark,	-	2 „
„ Orris root,	- -	1 „
Infusion of roses,	- -	4 fluid ounces.

The infusion to stand for a day or so upon the powders, with frequent stirring, then decant and filter.

The same author recommends the following for soreness and ulceration of the gums:

Borax, - -	2 scruples.
Honey, - -	1 fluid ounce.
Sage tea, -	4 fluid ounces.

This is a favourite and very general domestic remedy, and will be found very soothing and healing.

The same author that has been quoted above, says, that "the pleasantest, and at the same time the most efficacious mouth-wash which he has ever employed, is the following:

South American soap bark	8 ounces.
Pyrethrum, - - - -	1 „
Orris root, - - - -	1 „
Benzoice acid, - - -	1 „
Cinnamon, - - - -	1 „
Tannic acid, - - - -	4 drachms.
Borax, - - - - -	4 scruples.
Oil of wintergreen, -	2 fluid drachms.
Oil of peppermint, - -	4 „ „
Cochineal, - - - -	3 drachms.
White sugar, - - - -	1 pound.
Alcohol, - - - -	3 pints.
Pure water, - - - -	5 pints.

Mix the ingredients thoroughly, digest for six days, and filter."

Dr. Koecker recommends the following, as being very servicable: "Take of clarified honey, three ounces, and of vinegar, one ounce; this diluted in the proportion of three table-spoonfuls to a pint of warm sage tea, or water, may be used frequently during the day."

"Take of clarified honey, and of the tincture of bark, two ounces each; mix and dilute as above."

"Take of honey and the tincture of myrrh, two ounces each; mix and use as above."

Mr Bell recommends the following:—

Alum, - - - 2 drachms.

Decoction of Peruvian bark, 2 fluid ounces.

Infusion of roses, - 2 „

But when the last prescription is used, the mouth, immediately after, should be thoroughly washed with water and a soft brush, to prevent the sulphuric acid of the alum from exercising a hurtful effect upon the teeth.

Should these means fail to effect a cure, and the

matter from around the necks of the teeth still continue to flow, and should the gums still remain in a spongy state and give no symptoms of healing, then their margins should be touched with a strong solution of nitrate of silver. This very seldom fails to impart to them a healthy action and a speedy cure.

But whilst using the means to effect a cure, great care should be taken to guard against a recurrence of its exciting causes. All extraneous matter should be prevented from accumulating on the teeth, and they should be cleaned with the brush in the morning, after each meal, and before retiring to bed. Some pain may be felt at first by the application of the brush, but, nevertheless, it must be persevered in, for without it all remedies will be of no avail. The very rubbing of the teeth, besides being of great use for cleaning them, will have the effect of imparting to them a healthy action.

CHAPTER XVI.

Anæsthetics: Their Use in the Extraction of Teeth.

THERE have been many agents used, having for their aim the alleviation of pain during surgical operations, the most useful of which are ether and chloroform. Dr. W. G. L. Morton, Surgeon-Dentist, Boston, Mass., America, was the first to introduce, successfully, sulphuric ether as an agent producing insensibility to pain during surgical operations. This happened in the year 1846, and in the following year, Professor J. Y. Simpson, of Edinburgh, discovered and made known to the public, the use of chloroform as an anæsthetic. The mode of using it is by inhalation of the vapour, and it produces its anæsthetic effect in a short time—the ether taking from seven to ten minutes, and the chloroform from

thirty seconds to two minutes. When the ether is used, six to ten, or fifteen ounces are used, but when chloroform is employed, thirty to one hundred and fifty drops are only required.

Various instruments were invented for the inhalation of the vapour, but it soon became apparent that less expensive and simpler means were more preferable, because they could be more easily regulated and adapted to circumstances. It is found by experience, that the best method is to inhale it from a sponge or handkerchief, for, in this case, the admission of the air is entirely under the control of the operator, and he can regulate it according to the requirements of the case.

The patient should be in a reclining or horizontal position during the time of inhaling the vapour, as the force of the circulation of the blood is more equalized. If there be any functional derangement of the heart, lungs, or brain, anæsthesia should not be employed, or, if employed, it ought to be with the greatest caution.

After the patient is placed in a comfortable posi-

tion, and his mind freed from apprehension, he should be instructed to breathe tranquilly by full inspirations, and, in order to give the respiratory organs no obstruction, to guard against any compression of the chest. A strict watch must be maintained over the patient during the time he is inhaling the anæsthetic, carefully noticing that the breathing is free and easy, that there is no irritation of the throat or bronchia, that the skin should retain a florid, lively colour, not becoming blanched. But the great criterion is the pulse, and its indications should be strictly observed; the pulse generally becomes more frequent when ether or chloroform is administered, but it should not be much accelerated, nor its strength be much diminished; if the pulse become weak or irregular in its action, it should be regarded as a warning, and the operator should desist if the weakness or irregularity becomes very marked. The first effects of chloroform should be strictly watched, as it sometimes happens that death takes place after a few inhalations.

Chloroform is quicker and more powerful in its effects than ether, and therefore more liable to do injury, besides, it is not considered so safe as ether when taken into the system by inhalation; chloric ether, that is, a mixture of ether and chloroform, is sometimes used, the object of which is to obtain greater promptness than with ether alone, and at the same time, to incur less danger than with chloroform. If ether or chloroform has been given until the patient becomes entirely unconscious, he should be allowed to pass out of the condition of his own accord, if not, he is liable to have headache, depression, and nausea.

Should it happen that respiration becomes suspended, and the circulation partially or altogether stopped, immediate measures ought to be adopted for the restoration of the patient, as this is a condition of imminent danger. The first thing the operator should endeavour to do is to restore respiration, and every effort should be resorted to, to bring back the circulation by friction, &c. Every known method should be tried in order to

re-establish suspended animation, such as throwing cold water upon the face, throat, and chest, and volatile stimulants should be applied to the nostrils. The operator should take a feather and touch the glottis, to cause titillation and excite it to action, he should also adopt artificial respiration. Prompt and efficient measures should immediately be tried in all cases of this kind, for delay of a few minutes may bring about fatal results.

Local Anæsthesia.—There are great prejudices against systemic anæsthesia on account of the fatal results that have sometimes taken place in the course of using it. Local anæsthesia, therefore, has been much practised both by the Surgeon and the Dentist. Among the many agents for producing this may be reckoned that of congelation. There have been various freezing mixtures tried, but the simplest, and perhaps the best, consists of two parts of pounded ice and one of common salt. It is used by means of an instrument of the following description, designed by Dr. Branch, of Chicago, Ill., and is thus described:

"It consists of a hollow vulcanized india-rubber tube, about five inches long, and one inch in diameter, closed at its superior extremity by a screw-cap, and open at its inferior, which latter is slightly enlarged and cut out, so as to leave two lips to reach down on the sides of the tooth, within the tube is a follower and spiral spring, the latter forcing the former down to the open end. When this instrument is to be used, tie a piece of oiled silk, or membrane, loosely over its inferior end, fill it expeditiously two-thirds full with the ice and salt, prepared as above, adjust the follower and spring in place, screw on the cap, and apply at once. The sac of the instrument is to be pressed and worked gradually down till it invests a portion of the gum on each side of the tooth to be extracted, as the ice melts in the sac, the follower forces the unmelted portion down next to the tooth and gum. The application should be continued from one to three minutes, or till the margin of the gum is congealed—as will be indicated by its hardness and whitened appearance—and then the

tooth should be extracted as expeditiously as possible, though with all the ordinary skill and care."

But the sudden transition sometimes produces great pain, and many, rather than suffer the pain caused by the application of the cold, prefer the momentary suffering consequent upon the extracting of the tooth.

Messrs. Horne & Hornthwaite, philosophical instrument makers, London, in order to obviate the above objection, constructed an apparatus at the suggestion of Mr. Blundel, Surgeon-Dentist, London. The apparatus is described thus:—"The required amount of water is cooled down by means of ice and salt to about zero, in a vessel called the refrigerator, to this vessel is attached another called a graduator, containing warm water at about 100 degrees, and so constructed as to allow the slow admixture of its contents with the chilled water in the refrigerator, and thus produce a gradually diminishing temperature, for the purpose of preventing sudden shock and pain to the teeth, which a direct application of cold would invariably cause. A tube conveys this gradua-

ting current into a terminal portion constructed of very fine membrane, which always adapts itself to the form of the gums, and wholly surrounds the tooth to be drawn. The fluid then passes away through an exit tube; in this manner a constant current of cold, at a decreasing temperature, is made to pass over the part, abstracting therefrom all heat, and with it the power of feeling."

Electro-Magnetism.—It is about twelve years since the general introduction of electro-magnetism to the Dental profession, and it has been extensively used; however, there is a great diversity of opinions concerning its capability of relieving pain. Very much depends upon the temperament of the individual, for an electric current to some individuals is quite intolerable, while to others it produces pleasurable sensations, so that it cannot be relied upon in all cases. Dr. Harris says, "that the experience of the profession up to 1863 may be briefly summed thus: In one fourth of the cases it relieves or neutralizes the peculiar pain of extraction; in one half, it has but little effect; and in the remaining

fourth, it very decidedly aggravates the pain. It has, however, the advantage over chloroform, and the freezing process of being without any serious results."

INDEX.

Abnormal Dentition, 15.
Acute Inflammation of the Dental Pulp, 75.
Anæsthetics: Their Use in the Extraction of Teeth, 122.
Artificial Teeth, 104.
Atrophy of the Teeth, 62.
    Cause of, 64.
    Treatment of, 65.

Caries of the Teeth, 40.
Causes of Caries, 42.
Chronic Inflammation, 78.
Composition of the Teeth, 32.
Comparative View of the Teeth of Man and Animals, 90.

Dentition—Formation and Evolution of the Teeth, 5.
Deposits upon the Teeth, 53.
    Method of Removing it, 56.
Differences of the Temporary and Permanent Teeth, 37.
Diseases of the Teeth, 38.
Diseases of the Dental Pulp, 73.

Electro-Magnetism, 129.
Enamel, 34.

Exciting Causes of Caries, 45.
Exostosis of the Teeth, 70.
Cause of, 72.

How the Teeth may be Preserved, 99.

Irregularity of the Teeth, 59.

Local Anæsthesia, 126.

Necrosis of the Teeth, 66.
Causes of, 68.
Treatment of, 68.

Permanent Teeth, 32.
Porcelain, or, as they are sometimes called, Incorruptible Teeth, 109.
Prevention of Caries, 50.

The Teeth, 30.
Teeth of Cattle, 108.
Temporary Teeth, 31.
Toothache, 80.
Causes of, 81.
Treatment of, 88.
Treatment of Caries, 51.
Tusks from the Elephant and Hippopotamus, 109.
The Gums and some of their Diseases, 111.
Treatment of, 117.

Value and Importance of the Teeth, as regards Health, Comfort, Personal Appearance, &c., 92.

GLASGOW UNIVERSITY LIBRARY

GLASGOW
UNIVERSITY
LIBRARY