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THE TEETH.



# THE TEETH:

NATURAL

AND

ARTIFICIAL.

BY

J. W. WHITE, M.D., D.D.S.

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# THE TEETH:

## NATURAL AND ARTIFICIAL.

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THE sum-total of popular information regarding the teeth—the importance of their preservation and the means for accomplishing it, the necessity of their treatment when diseased and of their replacement when lost—is lamentably small, and much of it is erroneous. Many otherwise intelligent persons are sadly deficient in a proper appreciation of the subject, and not infrequently suffer from protracted derangements of health which have their unsuspected origin in the dental organs. The process of mastication, which is a necessity in preparing the food for the nourishment of the system, cannot be properly accomplished unless the masticatory apparatus is in good condition. When, in addition to this fact, the importance of the teeth in assisting vocalization—distinctness of utterance—and the necessity for their preservation in order to maintain

the natural symmetry of the features are considered, there will be seen abundant reason for an effort to awaken a general interest in the prevention and arrest of decay.

Although its origin may be traced back to a remote period, it is only within a few years that dentistry has taken the position to which its importance entitles it. The science which teaches the structure, functions, diseases, and treatment of organs which hold so important a relation to the entire economy as do the teeth, demands a devotion to it such as other specialists give to the development of the highest skill in the particular direction which they elect to pursue. Dentistry has been defined as "medical science applied to the prevention, modification, or removal of the causes and effects of disease in the dental organs;" and its practice demands scientific mechanism and artistic culture—skill in construction and judgment in application—so that the thoroughly qualified dentist is to some extent physician, surgeon, artist, and mechanic.

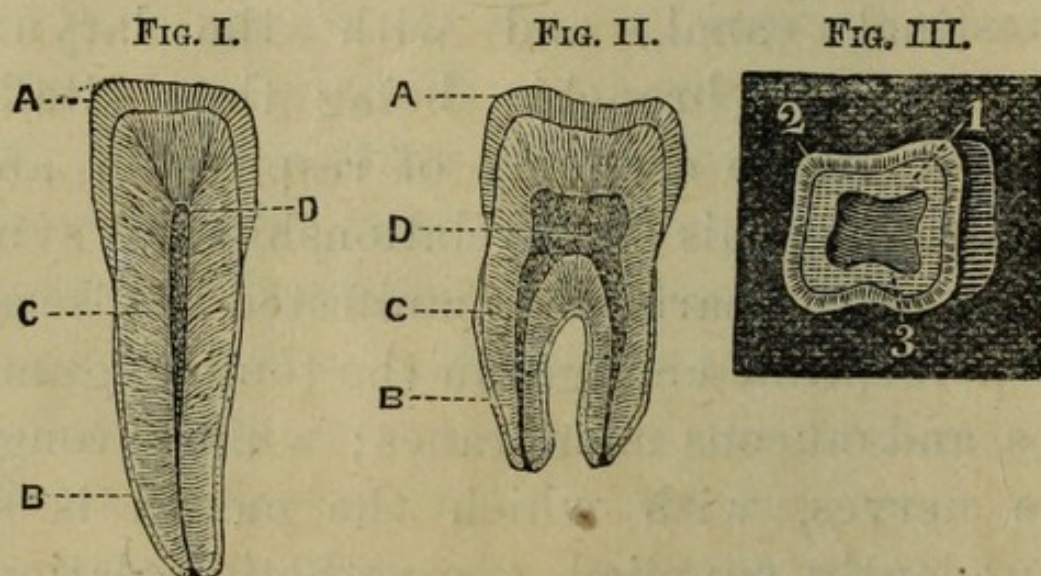
The different parts which in combination constitute the mouth form a very important and complicated portion of the animal economy, being connected by sympathetic rela-

tions with the entire organism; made up of bones, muscles, arteries, veins, nerves, mucous membrane, etc.; containing the tongue, teeth, alveolar ridges, and gums; and receiving the secretions of various glands.

The mouth—the organ of speech and mastication—is not only the most expressive and characteristic, but also the most important, of all the features. It is connected by means of its lining mucous membrane with the pharynx, esophagus, stomach, and intestinal canal, and with the larynx, trachea, and bronchi; being thus vitally related to the economy of respiration and digestion. This close relationship and sympathy of the parts are manifested in disease by perceptible changes in the tongue, gums, lips, and mucous membranes; while through the nerves, with which the mouth is so abundantly supplied, sympathetic relations are established with the eyes, ears, and, in fact, with every part of the body.

The development of the teeth is one of the most curious and interesting of the processes of growth in the body. Their germs begin to appear at about the seventh week of fetal life, gradually increasing in size, and assuming their proper shapes. At birth the forms

of the crowns are fully developed, though the roots are as yet but partially formed. The teeth consist of (1) the *pulp*, commonly called the nerve, occupying the chamber in the crown and the canal extending through the root; (2) the *dentine*, which constitutes the largest part of the tooth; (3) the *enamel*, which forms the covering and protection of the crown; (4) the *cementum*, which covers the root. The figures represent, (I.) a central incisor, and (II.) a molar tooth, split so as to



show the various parts, in which A is the cutting edge or grinding surface, covered, as is the entire crown, with enamel; B, the cementum; C, the dentine; D, the pulp. Fig. III. shows a cross-section of a molar of natural size, in which 1 is the dentine; 2, the enamel; 3, the pulp. The exposed part of a tooth—that above the gum—is called the

*crown*; that which is held within the socket, the *root*; and the narrow part between the crown and the root, the *neck*.

Two sets of teeth are developed in the human mouth—the first called the deciduous, temporary, or milk teeth; the second, the permanent. The temporary set—twenty in number—consists of two central and two lateral incisors, two canines or eye teeth, and four molars or double teeth, in each jaw. There is no absolute rule for the time or order of their appearance; some children being born with teeth, while in others their eruption is delayed much beyond the average period.

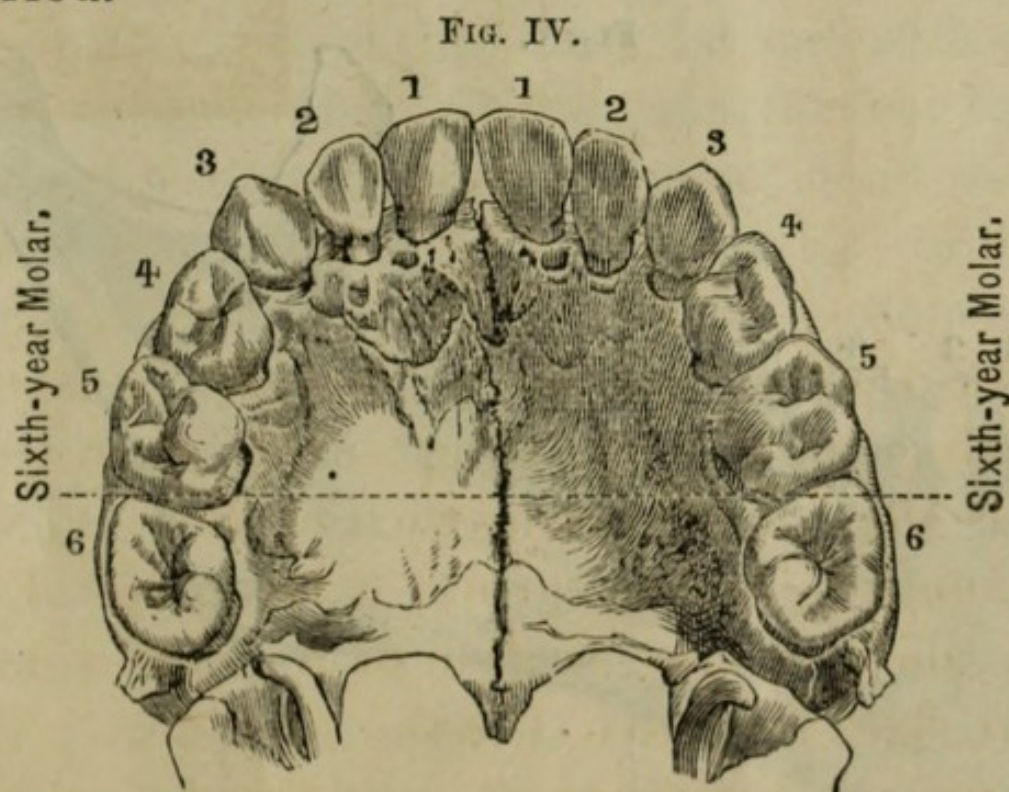


Fig. IV. represents the upper teeth of a child about six years of age. These teeth

are known by the following names, and erupt *usually* in the order given :

2 Central Incisors,	Nos. 1, bet. 5th & 8th mos.
2 Lateral        "	" 2, " 7th & 10th "
2 Canines, or Eye-Teeth,	" 3, " 12th & 16th "
2 First Molars,	" 4, " 14th & 20th "
2 Second       "	" 5, " 20th & 36th "

The lower teeth are known by the same names, and appear in the same order, *generally preceding the upper by a few weeks.*

*The molar teeth marked No. 6 do not belong to the temporary set, but as they make their appearance between the fifth and sixth years, are generally supposed to belong to the first set, and are frequently allowed to decay beyond remedy before the mistake is discovered.*

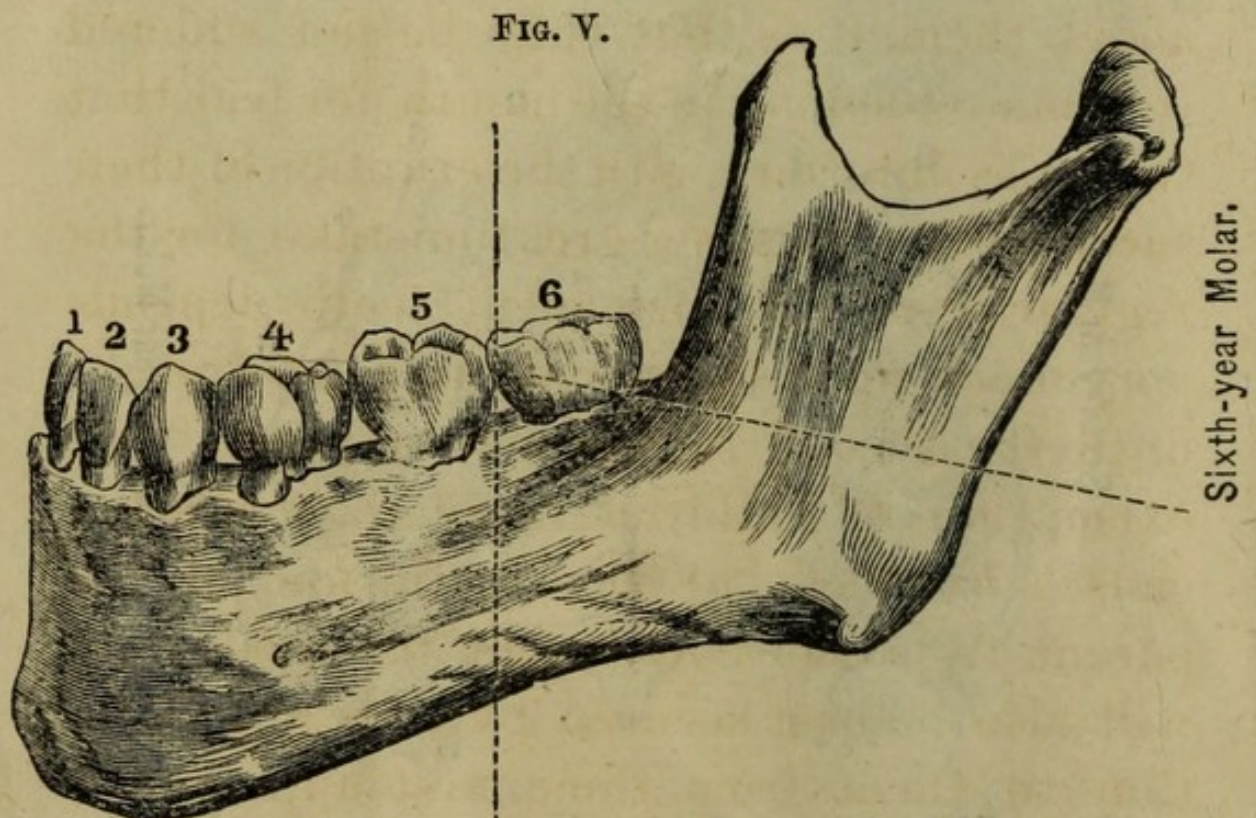


Fig. V. is a *side* view of the child's lower jaw.

An erroneous idea prevails with many people that the teeth, like the hair and the nails, continue to grow after they make their appearance through the gums. Their crowns are completed, as to size and form, before their eruption, though they gradually become denser and harder. The temporary teeth are smaller than the permanent, and of a less firm and solid texture; when, therefore, decay commences in the former, it proceeds more rapidly than in the latter, and for this reason the temporary need more care than the permanent teeth. It is a common error that because they are temporary they do not require attention; or, if any anxiety is felt about them, it is that they be not suffered to remain too long in the mouth, for fear that they may interfere with the eruption of their successors. This is a great mistake, for the regularity of the permanent teeth depends very much upon the retention of the first set until the second is ready to appear. The exemption of children from the suffering caused by decay of the teeth, and of the parent from the consequent inconvenience, will also be best secured by constant attention to them from their first appearance. Moreover, the general health of the child will

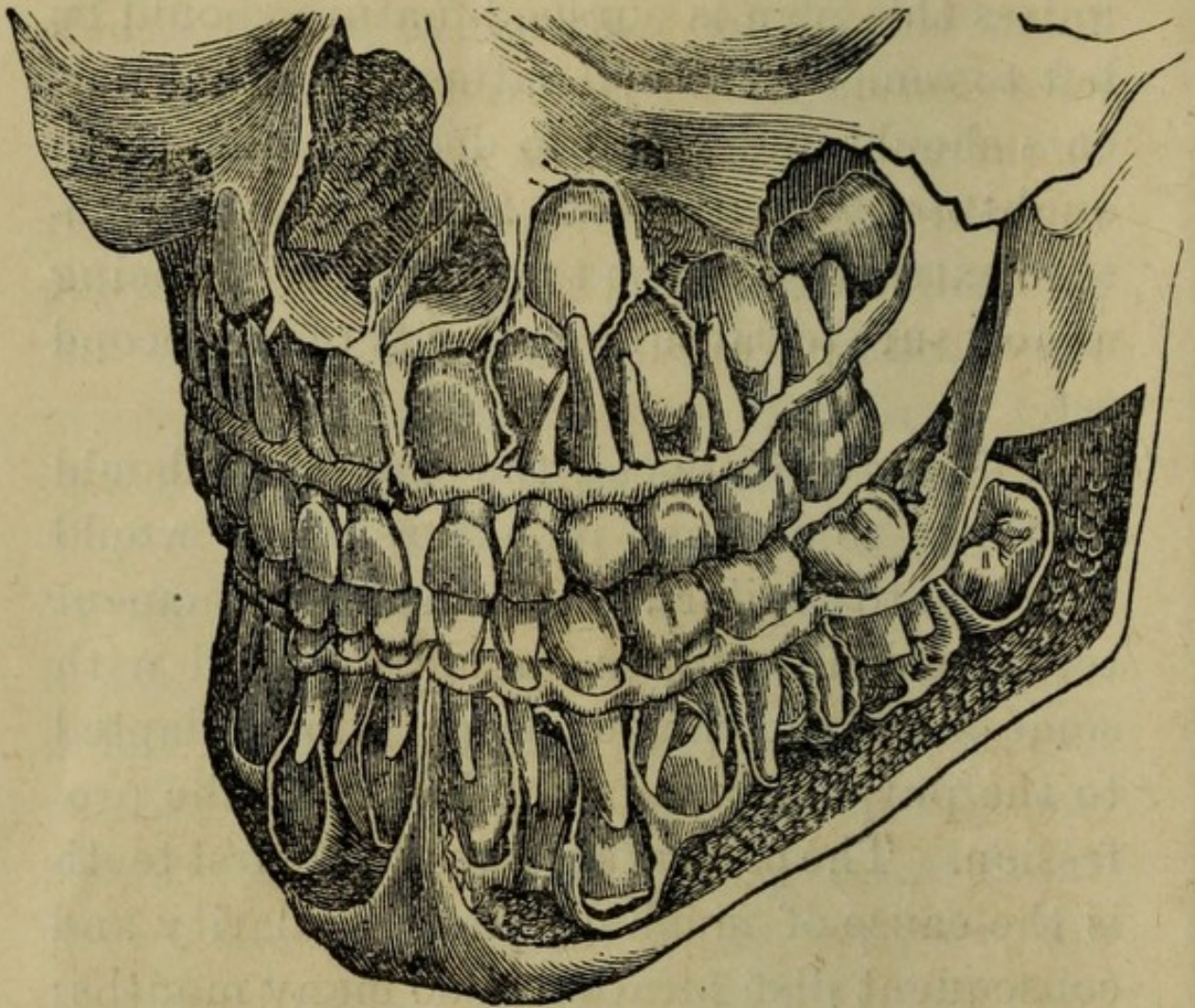
be promoted by keeping these organs in such condition that mastication can be performed without pain; otherwise the child will soon learn to avoid that which is inconvenient or painful, and, by swallowing its food without proper mastication, will entail upon itself all the evils of indigestion. In infancy the mother should make it a part of the daily care of the child to secure the habitual cleanliness of its teeth. Becoming thus accustomed to it, the child, when old enough to use the brush, will find it impossible to feel comfortable after a meal until the teeth have been cleansed as carefully as the face and hands. Small, soft tooth-brushes and pleasant dentifrices, exactly suited for the purpose, are now manufactured; these, if the habit of use is early formed, will soon become a necessity to the child's comfort; and the practice thus commenced will be almost sure to be continued through life. In those cases where, in spite of all the care that is given to them, the temporary teeth decay, or where the eruption of the second set takes place before the roots of the temporary teeth have been absorbed, the child should be taken to an intelligent dentist, who is capable of deciding in regard to the best treatment to be adopted;

but it may be safely affirmed that, as a rule, unless this plan is pursued, nature should be left to remedy the evil rather than that parents should undertake to decide which teeth ought to be extracted, and when; premature extraction of the temporary teeth being almost sure to cause irregularity of the second set.

If decay commences, the same care should be taken to prevent its extension as would be given to similar trouble in the permanent teeth, and all cavities should be filled with some one of the various preparations adapted to the purpose now in the hands of the profession. The premature loss of the first teeth is the cause of much of the irregularity and consequent disfiguration of so many mouths; and when it is remembered how much is involved in this loss,—not only the ability to masticate the food and to enunciate correctly, but the comeliness of the face through life,—the importance of attention in season cannot fail to be appreciated. A good rule is to have a dentist examine the mouth, after the child is two and a half years old, at least twice a year, or oftener if necessary.

The provision for a second or permanent set of teeth begins long before the birth of

FIG. VI.



the child, and while the temporary teeth are erupting the permanent are in various stages of development. The relation of the two sets of teeth is shown in Fig. VI., which illustrates the position of the teeth in the jaws of a child about six years of age; the temporary teeth are still in place, and the sixth-year molars are just erupting. By a process called "absorption," the roots of the temporary teeth are gradually removed until only the crowns remain. Thus deprived of

their support in the sockets, the deciduous teeth become loose and give way to their successors. Under favorable conditions they ought not to decay, but should simply lose their hold in the jaw from absorption of their roots, and drop out white and clean as when they first appeared.

FIG. VII.

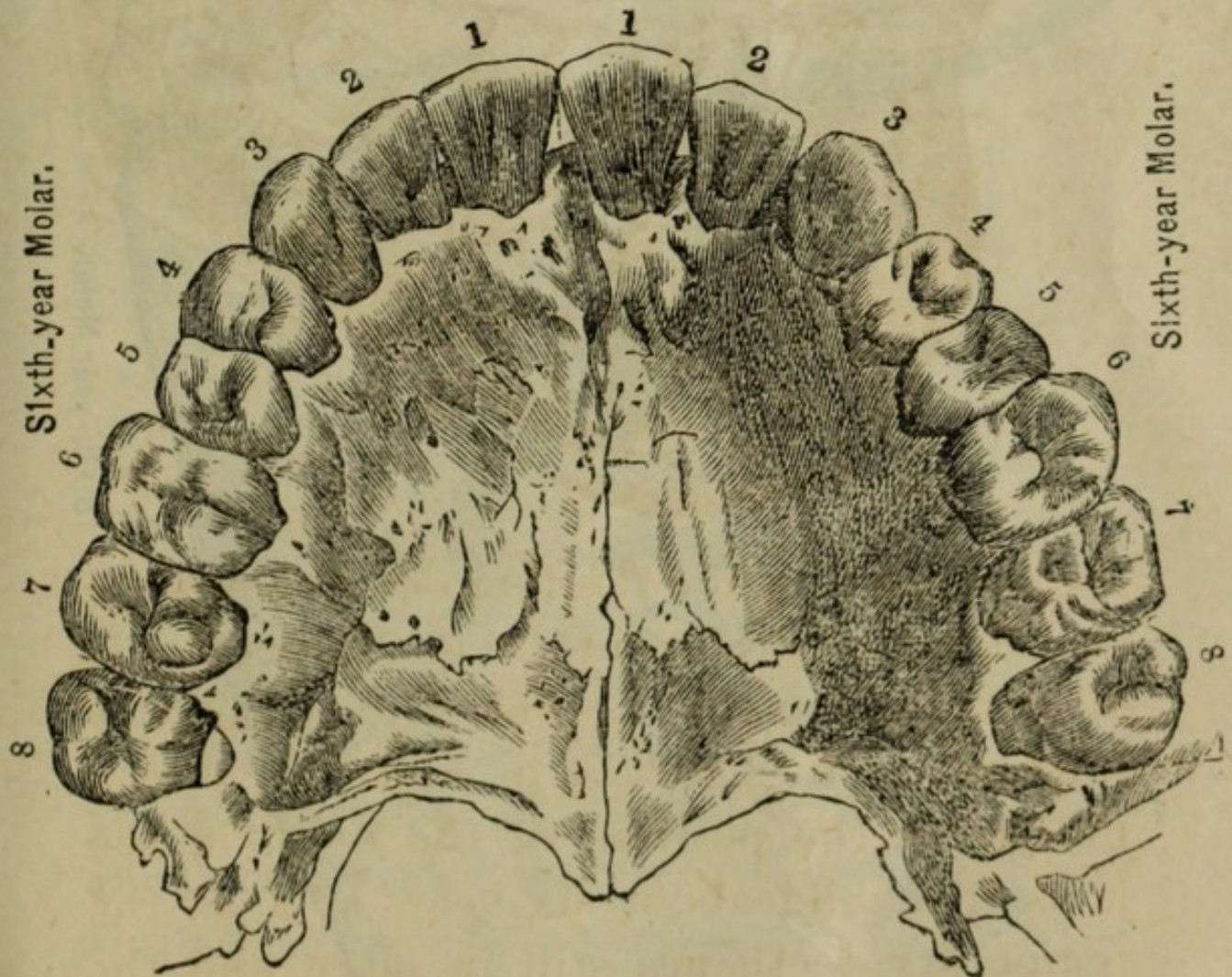
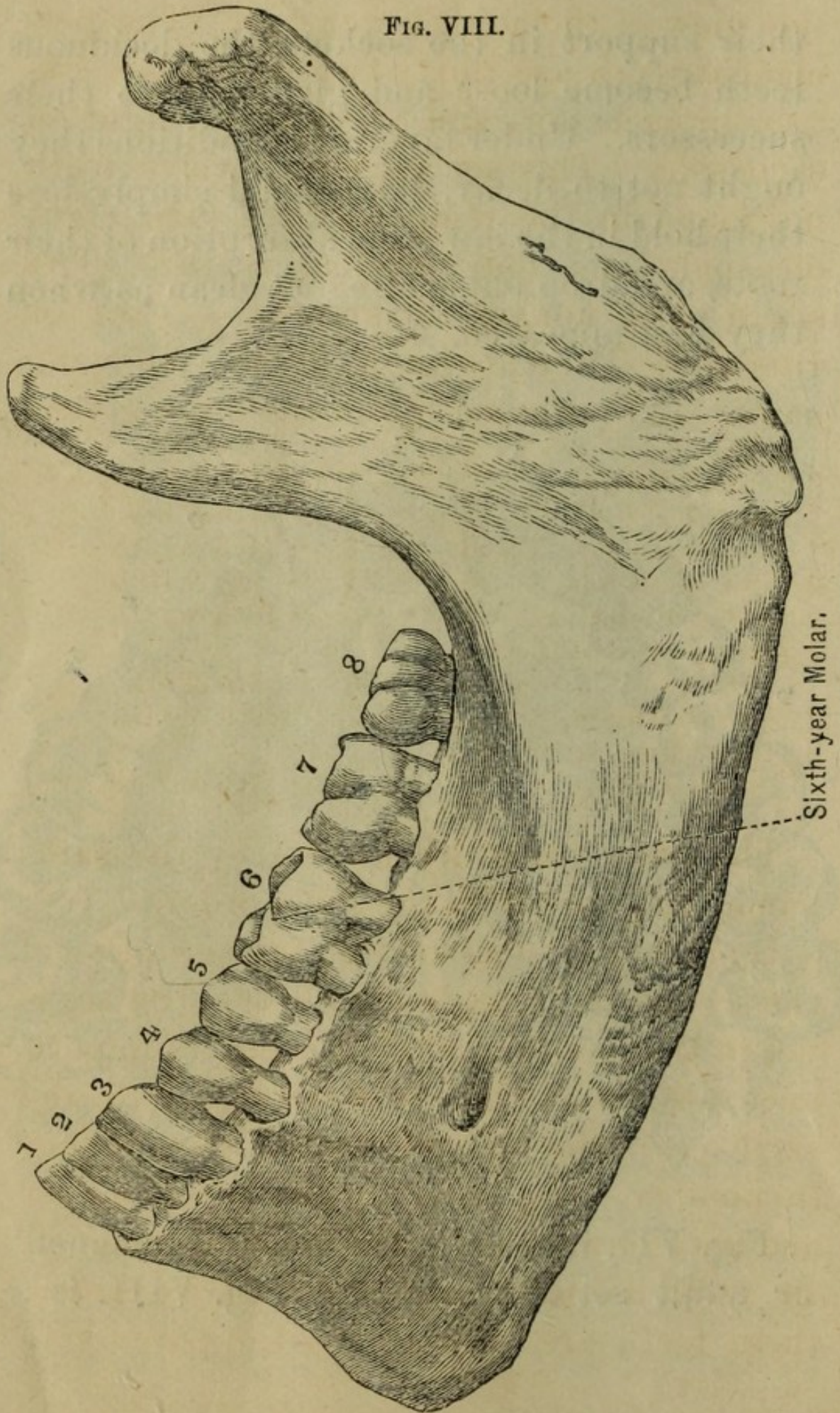


Fig. VII. illustrates an upper permanent or adult set of teeth, and Fig. VIII. is a

FIG. VIII.



side view of the adult lower jaw. The permanent teeth are thirty-two in number, sixteen in each jaw, and are in pairs, eight on each side. This set includes twelve teeth not found in the temporary set, viz.: eight bicuspid and four wisdom teeth. (THE SIXTH-YEAR MOLARS CONSTITUTE A PART OF THIS SET.) They are known by the following names, and erupt *usually* in the order given:

2 Central Incisors,	Nos. 1, bet. 6th & 8th years.
2 Lateral “	“ 2, “ 7th & 9th “
2 Canines, or Eye-Teeth,	“ 3, “ 11th & 13th “
2 First Bicuspid,	“ 4, “ 9th & 10th “
2 Second Bicuspid,	“ 5, “ 10th & 11th “
2 First, or Sixth-year, Molars,	“ 6, “ 5th & 6th “
2 Second Molars,	“ 7, “ 12th & 14th “
2 Third Molars, or Wis- dom Teeth,	“ 8, “ 17th & 25th “

The *lower* teeth are known by the same names and appear in the same order.

It must be remembered that the eruption of the second teeth begins while the first set is yet in the mouth, and because of its importance we repeat that between the fifth and sixth years the first permanent molars, four in number,—one on each side of the upper and lower jaws,—make their appearance. If the child has never had any teeth extracted, these teeth are supposed by the parents to

belong to the first set; and so, if, as very frequently occurs, they decay shortly after their eruption, no attention is paid to them, because it is thought that they will soon have to make room for their successors, and before the error is discovered the mischief is irreparable. Although, as already stated, the teeth are fully formed before they appear through the gums, the enamel has not then acquired the compactness and hardness which afterwards characterize it; it does not attain its maximum density for months, sometimes years. Consequently, decay makes greater ravages in this period than at any subsequent time. This fact shows the necessity of extra care and the promptest attention to any evidence of disease in them at this time; for if they can be preserved until the enamel has become thoroughly solidified, their liability to decay is very much lessened, and the chances of retaining them through life are vastly increased. After the fifth year, parents should count their children's teeth occasionally, and when more than five teeth are found on either side of either jaw, they may know that the last one belongs to the second set, *and that, if lost, it will never be replaced*; that, if extracted ex-

cept at the exact time when the conditions are most favorable, the results may be disastrous to the entire denture.

Usually, between the seventeenth and twenty-first years, the third molars, or wisdom teeth (so-called because they do not appear until the individual has reached maturity), are erupted. There is generally but little inconvenience attending their appearance; but in those cases where there is not sufficient room for all of the teeth in the jaws, there is considerable pain and swelling, and sometimes sore throat, difficulty of swallowing, and severe constitutional disturbance. Under these circumstances, lancing the gums and systemic treatment are often demanded, and in some extreme cases even the extraction of the tooth or of the one in front of it. At six, at twelve, and at seventeen years of age, or until the wisdom teeth have been fully erupted, it is well for patients suffering from eye or ear troubles, or from any deranged condition not otherwise accounted for, to seek the opinion of a competent dentist, in order to learn whether or not an explanation is to be found in the mouth.

The importance of proper attention to the cleanliness of the teeth can hardly be over-

stated, and yet few, even of those who pride themselves upon the care which they bestow upon these organs, give to them the time and labor which their value would justify. As a preventive of diseases of the teeth and gums, constant attention to their thorough cleanliness is of unquestioned importance; for thus not only is the formation of tartar prevented, but the removal of particles of food and other extraneous matters (which lodge about and adhere to them, and which, if allowed to remain, would corrupt the secretions of the mouth and irritate and inflame the gums) is secured.

The deposit called tartar, which collects more or less about the teeth of every one, varies greatly in appearance, quantity, and character. In different individuals it is black, brown, green, yellow, or nearly white. Its presence is more or less hurtful according to its character and quantity. In some cases its influence is exceedingly pernicious, causing the gums to become swollen, inflamed, and spongy; suppuration occurs about their margins, followed by their recession from the necks of the teeth, and by the absorption or waste of the sockets. The gums become so sensitive that the use of a

tooth-brush is exceedingly painful, and because of this no effort is made to keep the mouth clean. The tartar accumulates rapidly, and the result is the destruction more or less speedily of the alveolar processes, and the loosening of the teeth until they drop out.

These, however, are not the only results. The breath becomes fetid; the fluids of the mouth are vitiated; indigestion, loss of appetite, affections of the eyes, pains in the ears, headaches, neuralgias, and general disturbance of the health follow. That derangements of the digestive functions and consequent impairment of the whole economy may result from a diseased condition of the mouth, is too well established to require argument. The presence of decayed teeth and roots, ulcerated or suppurating gums, accumulations of tartar, etc., must necessarily pollute the saliva, and thus cause irritation more or less severe of the mucous membranes of the stomach. The exhalations from a mouth so diseased may also, and no doubt they often do, produce an injurious effect upon the bronchial tubes and lungs.

These being facts, it is much to be lamented that many parents are so neglectful as to

allow their children to grow up without having acquired the habit of keeping the mouth scrupulously clean; paying no attention to the condition of the teeth until an exposed nerve speaks with a voice that will not be silenced, announcing the mischief which has been allowed to proceed unchecked. Still more, it is wonderful that so many persons fail to appreciate the importance of taking care of their own teeth, until compelled to do so by their decay and the consequent suffering. Then, when the demand has become imperative, their chief thought seems to be, not how best to prevent further mischief, and retain what is left of their dental organs in as perfect condition as may be, but how cheaply immediate palliation of their discomfort can be secured; and as though there were no gradations in skill, or in value of the materials used, making no account of the time required for faithful service, they think only of the cost, and congratulate themselves when they succeed in finding a *cheap* dentist. This is the worst possible economy. Judgment and proficiency are the results of time and labor, and they should command a remuneration equivalent to their worth.

There is a great difference in the liability

of the teeth of different individuals to decay,—the teeth of some being so susceptible to the action of corrosive agents that they begin to decay as soon as they emerge from the gums; while those of others remain without giving evidence of injury, though exposed to the same influences. Even in the same mouths, some teeth are more susceptible to decay than the rest, owing to constitutional conditions at the time of their formation, resulting in varying degrees of density in their texture, and consequently of capability of resisting the action of destructive agents. Beyond question, however, the chief cause of caries is the fermentation and decomposition of food about and between the teeth.

But, as has been already stated, decay is not the only enemy of the teeth. Many persons lose their teeth by the destruction of the means of their support—the absorption of the gums and sockets caused by the presence of tartar. The liability to loss from this cause, though not absolutely confined to those whose teeth are neglected, is yet a danger which always specially threatens those who pay too little attention to the hygiene of the mouth, and might, in a majority of instances, be prevented by intelligent care,—

recession of the gums or absorption of the sockets rarely occurring in mouths that are habitually kept pure.

The probable preservation and usefulness of the teeth for speech and mastication till advanced life, the favorable impression made upon the general health by the ability to thoroughly masticate the food, the comfort of a pure breath and wholesome saliva, and the agreeable effect produced upon others by the exhibition of a clean and healthy mouth, are surely inducements which should lead all to pay that attention to their teeth upon which their appearance, preservation, and usefulness depend.

To insure proper cleanliness, the teeth should be brushed on rising in the morning, and before retiring. The latter is really the more important, because, while the tongue and muscles of the mouth are at rest during sleep, foreign substances or deposits upon the teeth have the longest time and the best opportunity to exert an unwholesome influence. A good tooth powder should be used once daily, preferably at bedtime, and a detergent wash or soap in the morning. For cleansing after meals, it will be sufficient to use tepid water, to which have been added a few drops

of spirit of ammonia, or a little bicarbonate of soda, or lime-water, simply to neutralize any acidity; a thorough rinsing of the mouth, and the careful (not too vigorous) use of a soft brush, merely to dislodge adhering or impacted food, being all that is required. Much mischief is wrought by the use of unsuitable brushes and too energetic brushing. Most of the brushes in the market are too stiff and too large, and most of the tooth powders are too gritty.

Every accessible surface of the teeth should be thoroughly cleaned, the removal of accumulations of food from the depressions in the bicuspid and molars, and from between the teeth, being the chief object to be secured by the use of the brush. The upper teeth should be brushed downward and the lower teeth upward, so as to encourage rather than interfere with the growth of the gums down about the necks of the teeth.

A toothpick made from a quill should be used after eating, and all particles of food carefully picked from between the teeth.

Patent nostrums and advertised powders and washes should be avoided, and only those preparations used which are made or recommended by an intelligent practitioner. Any

*wash* that is recommended for whitening the teeth, is either incapable of accomplishing it, or does it at the expense of the enamel.

With the observance of these precautions, and a visit to a good dentist every six months, so that the first evidence of disease may be met and combated, there is no reason why the majority of persons should not preserve their teeth to old age.

When the natural teeth have been lost, the deficiency should be supplied by substitutes. The comfort, the health, the speech, and the personal appearance of the individual will be advantaged thereby, provided that the substitution is skillfully and artistically accomplished.

The most favorable time for the insertion of artificial teeth is as soon after the loss of the natural ones as the state of the mouth will allow, and before the muscles of expression have been suffered to lose their natural action.

There are various bases for artificial dentures. No one of the different materials is always the best. Each of them has peculiar fitness for special cases.

There is, probably, on the part of all who contemplate wearing artificial teeth, a desire

to know something of their composition and manufacture. A brief description of the materials employed, and of the processes, will be interesting. The principal ingredient entering into their composition is a mineral known as Feldspar, found in abundance in various parts of the world, and used in the manufacture of china and stoneware. The purest variety is required for dental purposes. Next in importance is Kaolin, a soft, plastic, unctuous clay, found in Pennsylvania and many other localities. Another essential is Flint or Quartz, sometimes called silica, and in its purest form known as rock-crystal. The principal coloring materials are Titanium, a mineral found in various localities of the United States, the crystals of which are reddish-brown, and have a bright metallic lustre, giving, when ground, a beautiful yellow or yellowish-brown color; Platinum, a metal, the oxide of which gives a blue color; and Gold, the precipitate of which is used to give the red color of the artificial gum. The silex and feldspar, in their crude state, are submitted to a red heat, and then suddenly thrown into cold water. This is called calcining; the effect is to render the substances more easily broken and pulverized. All impurities having

been removed, the spar and silex are crushed between flint stones, and when fine enough are put into a mill formed of buhr-stone, with chasers of the same material. They are there ground in water until fine enough to float; after settling, the water is drawn off; the silex and spar, dried and sifted, are then ready for use. The kaolin is prepared by washing until perfectly free from all impurities.

These materials are combined in proper proportions; the requisite amount of color is added, and the whole is mixed with water into a mass resembling putty.

The body and enamel differ in the proportions in which their constituents are combined, the enamel being required to fuse slightly in advance of the body, in order to take on a higher gloss in the furnace. They resemble each other, however, in general appearance; the colors which they are to assume requiring the intense heat of the furnace for their development. The molds are made of brass, and are in two pieces, one-half of the tooth being represented in each side. The precise shapes desired are carved out with great care; on them depend the shape and style of the teeth. The matrices must be anatomically correct, and mechanically perfect. In the

lower half of the mold holes are drilled to receive the platinum pins which serve to connect the teeth with the plate to which they are to be attached. The pins of proper length and thickness having been adjusted, the enamels are carefully laid in, by means of small steel spatulas, in the exact position and quantity required. The body is then placed, in lumps corresponding to the size of the tooth; the top of the mold is put on, and it is subjected to pressure, which compacts the masses in the matrices. They are then dried by a slow heat. When perfectly dry, the top is removed, and the teeth will drop out. In this state they are very tender, and require careful handling. They are now passed to the trimmers, by whom each tooth is carefully inspected, all imperfect ones being thrown out. The edges and the arch of the gum are smoothly filed and trimmed, and they are then placed on trays or slides of fire-clay, and are ready for the furnace. In the centre of this furnace there is a muffle or oven of fire-clay, entirely surrounded by the glowing fuel. The slides containing the teeth are placed in this muffle, and, according to the intensity of the fire, are allowed to remain from ten to thirty minutes, until the exact point of fusion is reached,

which must be determined by the practiced eye of the burner. This is the final operation. The fire has changed the dull enamel and lustreless oxides, and the teeth are now ready for the dentist.

A wonderful variety in size, shape, and color is necessary to meet the requirements of the operator and the needs of his patients.

If it is true of any pursuit, it is emphatically true of the attempt to imitate natural dentures, that "the beauty of the result well repays the highest exercise of art." The manufacturer should furnish teeth in accordance with nature's types, and each tooth in a set should harmonize with the rest; for, though each may be an exact representation of a natural tooth, the general effect is spoiled unless they are, in all their distinguishing features, of the same family or class of teeth. No two teeth in a natural set are alike; each one has its distinctive contour, and, besides possessing individuality, indicates the type of the adjoining teeth. In an artificial set, unless these distinctive differences and resemblances have been faithfully studied and copied, its artificial character is apparent.

An artistic dentist will take into account the complexion, age, sex, height, the color of hair

and eyes, and other characteristics of the individual, when selecting teeth to replace lost ones; and the manufacturer should be skilled in the observance of the varied classes of dentures required. To inattention in this direction on the part of the dentist, or to dictation on the part of the patient, are to be charged the unseemly incongruities constantly staring the observer in the face from mouths whose lost organs have been replaced in disregard of the universal law of *correspondence*.

This law of correlation—harmony—running through nature, attracts and enchants us by an infinite diversity of manifestations; the failure to recognize its demands by art is correspondingly abhorrent to our sensibilities.

In the social gathering, a lady who appreciates the law of harmony, delights the eye by the taste displayed in her attire; another, though more elaborately and expensively adorned, yet failing to harmonize the details of her costume, attracts attention only by the impression of incongruity. We hear frequently from a lady who is selecting a bonnet, or from a gentleman purchasing a hat or other article of wearing apparel, the question to a friend, "Does this become me?" the query indicating the recognition that, how-

ever exquisite the material, or excellent the manufacture of the article, there is a certain law of fitness, failure to comply with which makes the wearer appear ridiculous.

There is a similar relation between the physical characteristics and the teeth. A broad and square, or an oval face; a large, coarse-featured man, or a delicately-organized woman; a miss of eighteen, or a matron of fifty; a brunette or a blonde,—these and other varieties present as many types of teeth differing in size, shape, color, density, etc.

No matter how anatomically correct, or how skillfully adapted for speech and mastication, an artificial denture may be, if it bears not the relation demanded by age, temperament, facial contour, etc., its artificiality will be apparent to every beholder.

If teeth correlated in their characteristics to those which nature assigns to one class be inserted in the mouth of one whose physical organization demands a different order, the effect cannot be otherwise than displeasing to the eye, whether the observer is skilled in perception, or intuitively recognizes inharmony without understanding the cause.

Artificial teeth should be natural as to shape, color, and vital appearance; there

should be a nice blending of the colors of the body and enamel, not an abrupt line of demarkation between the two; there should be a precise degree of translucency, and a certain peculiar texture of the surface, which characteristics should be maintained by artificial light as well as by daylight; for many teeth which in daylight look reasonably well have a very artificial appearance when exposed in the mouth to an artificial light. They should also possess strength sufficient for the uses for which they are designed. This strength should come from the quality of their composition, the skillful distribution of bulk to parts most requiring it, and the due form, position, and proportion of the pins, rather than from any increase in bulk and weight beyond those of the natural organs. Besides all this, there must be taken into the account the varying forms of the jaw or maxillary ridge, so that the dentist may be enabled to select teeth which are adapted to each particular case, and which can be made to articulate nicely with each other or with the natural teeth, if there are any remaining in the mouth; otherwise his best efforts will not secure a good appearance, comfort to the wearer, or usefulness in mastication.

To meet all these requirements, the reader can easily perceive, is no easy task, and cannot be accomplished without an amount of attention to details, which effectually excludes artificial teeth from the list of *cheap* manufactures. The difference in all the essential characteristics which they should possess, appears when what are called cheap teeth are compared with the best. First upon the skill of the manufacturer, and then upon the judgment of the dentist, depends whether an artificial set of teeth will be pleasing or displeasing to the observer—"art concealing art" or suggestive only of *artificiality*.

"All works of taste must bear a price in proportion to the skill, taste, time, expense, and risk attending their invention and manufacture. Those things called dear are, when justly estimated, the cheapest: they are attended with much less profit to the artist than those which everybody calls cheap. Beautiful forms and compositions are not made by chance, nor can they ever, in any material, be made at small expense. A competition for cheapness, and not for excellence of workmanship, is the most frequent and certain cause of the rapid decay and entire destruction of arts and manufactures."

# THE MOUTH AND THE TEETH.

By J. W. WHITE, M.D., D.D.S.,

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