A treatise on second dentition, and the natural method of directing it : followed by a summary of stomatic semeology / by C.F. Delabarre ; translated from the French, for the American library of dental science, by *--A--*.

[*American Library of Dental Science.*]

A TREATISE

ON

SECOND DENTITION,

AND THE

NATURAL METHOD OF DIRECTING IT;

FOLLOWED BY

A SUMMARY OF STOMATIC SEMEOLOGY.

BY C. F. DELABARRE,

DOCTOR OF MEDICINE OF THE FACULTY OF PARIS, SURGEON DENTIST TO THE KING,
MEMBER OF THE ROYAL MEDICAL SOCIETY OF STOCKHOLM, ETC. ETC.

Opiniorum commenta delet dies: natura judicia confirmat.—CICERO.

Translated from the French, for the American Library of Dental Science.

BY *—A—*

BALTIMORE:

PUBLISHED BY THE AMERICAN SOCIETY OF DENTAL SURGEONS.
JOHN W. WOODS, PRINTER.

1845.

PREFACE.

FEW writers on odontology, occupy a higher position, or have contributed more largely to the advancement of this branch of medical science, than the author of the Treatise which we now present to the public for the first time, in our own noble and widely extended language.

It is true that his great abilities and excellent judgment, did not preserve him entirely from error, yet we hazard nothing in saying, that, for general correctness of opinion, extensive information and practical good sense, this work will compare favorably with any other on the same subject.

We have thought that a good treatise on Second Dentition, was much needed by the profession in this country. The position of the dental art, so rapidly rising in usefulness and respectability, demands more

extensive reading, and greater collateral information, than has heretofore been considered necessary for successful and reputable practice. We wish to contribute every facility in our power, to the attainment of an end so desirable; and we do not doubt that this treatise will be read with pleasure and profit, by those who love their profession sufficiently well, to desire to see it improved and elevated to its proper place in the medical sciences.—*Balt. Ed.*

SECOND DENTITION.

CHAPTER I.

GENERAL CONSIDERATIONS.

Whilst the various branches of the healing art are fast advancing to perfection, and the light of pathological research now lends its aid to practitioners, in the most complicated diseases; dental surgery by no means keeps pace with these improvements. It does not receive from our public schools, that attention which its importance demands; and although we have many exprofesso works on the structure and diseases of the teeth, how much do they not leave to be desired. The authors of nosology and physiology devote even some lines to them, but they appear to mention them only to complete the plan of their works, and thus they have treated them very superficially. Many indeed, though freely confessing the great want of knowledge, of the expansion, growth and diseases of the teeth, are nevertheless, by reason of their numerous engagements, unable to devote themselves to their study.

Formerly, these bones were regarded, indeed, as mere ornaments of the face, and consequently their preservation was rather the province of the perfumer than the regular physician.

Modern physiologists, however, in lecturing on the phenomena of digestion, have very clearly shown in what manner the teeth are necessary to the performance of one of those functions on which life depends. The alimentary canal it is now well known, is charged with those substances designed for the accretion and preservation of the individual, and that it must be aided in its operations, by mechanical means. The stomach of man cannot act with ease unless the destined aliment, has first

passed through a previous state of preservation. Our food, accordingly, is first roasted or boiled, and seasoned in various ways, before it is committed to the mouth, in order that it may the better be prepared to be submitted to the action of the stomach, by being penetrated with saliva; the secretion of which, is called forth by the presence of the food and by mastication. But how can this last be performed with jaws unfurnished with teeth?

In those animals which have a membranous stomach, the teeth are designed as auxiliaries to facilitate its operations, and as it has pleased the Creator to use an endless variety of means to produce the same results, those species, whose stomachs are of a weak texture, are supplied with teeth, while those supplied with great muscular power are unfurnished with them.

The stomach, in animals of the ruminating kind, whose dental arch is incomplete, generally supply the want of those bones, and the food is brought again to the mouth, there to be masticated anew and to be submitted again to *insalivation.*

Physicians of the present day, in other respects, better appreciate the importance of dentistry than those of a former age; they recommend it to our attention, they do not neglect to examine the habitual healthy state of the mouth, and are hence frequently enabled to make indications, which are useful to them in cases of disease.*

The phenomena exhibited in the development of these small bones, which now engage our notice, have attracted the attention of some and excited their curiosity; but to speak freely, this part of the science is too much neglected and too little understood, it demands from those who devote themselves to the honorable task of instructing pupils in all the branches of the great medical art, a less superficial study.

Although there have been a great many very interesting works on first dentition; still all the phenomena of which it is composed, have not yet been fully enumerated; it is for time and

* Notwithstanding the excellence of the most modern treatises on semiology, there are a number of important symptoms connected with the jaws, the saliva, the tartar, &c. which have not yet been mentioned.

experience to supply these deficiences; and happy will he be who shall diminish their number.*

Men of approved medical knowledge, however, have had first dentition under their inspection, but it is not thus with the branch we are now considering. This has been left to the observation and sagacity of dentists possessing not the requisite physiological knowledge.

The laws that govern the expansion, growth, and arrangement of the teeth, are properly the patrimony of the physician, who should understand them, in order to direct the dentist whenever (which unfortunately is too frequently the case) he is not furnished with sufficient information on all the duties of his profession.

It is very desirable that there should be a class of physicians, who would give their attention to the practice for the diseases of the mouth; this is the only means of preventing so interesting a part of our art, from falling into the hands of mere practitioners, or from becoming the prey of the vilest charlatans. Such persons cannot practice any part of surgery without detriment to society.

He that is nothing more than a mechanician, ought not to be admitted into the sanctuary of Esculapius, his duty here should be confined to those machines, with which alone he has the right to interfere.†

I repeat it, the knowledge of true dentistry is not sufficiently diffused, and it never will be, until it shall have been made as much a portion of *public instruction*, as the various other parts

* The work of Professor Baumes on First Dentition, should, nevertheless, be well studied, it is justly placed in the first rank.

† I have not room here to express my regret that goldsmiths, jewellers, watch makers and workers of ivory, having labored only as such in the laboratories of dentists, without having studied, without having ever assisted at their operations, should obtain permission to practice. Let us, however, hope, that under the wise regulations that are proposed for the practice of medicine, those sorts of admissions, will no longer occur, and that with them will also disappear those great teeth of varnished ivory that indicate the abodes of those dentists, and which to the shame of the art, are also seen at the doors of some more respectable personages.

of the art. Then and then only will it be cultivated by educated men, and will advance with the same vigor as the other branches of medicine.

The management of second dentition is a stumbling-block to dentists of moderate abilities; they have for this a certain routine, which, I say it with regret, is sustained by writings of authority with those, who find in these books of ready made opinions, food for their minds, and foundation for their practice, without giving themselves the trouble to inquire into their value.

It is in order to eradicate these errors, that I have determined to publish this work. It is not my intention to establish any new system; the natural method which I here explain, has been followed by many distinguished dentists, but they have either not made public the results of their experience, or have done it in a very brief manner. I here show that which enlightened men practice daily with success, and I only add some free reflections drawn from my own practice, and from anatomical examinations of the human jaw, considered from the first moment the adult teeth appear, until the period they take their place in that circle which after their growth they are destined to occupy. Thus, submitting my observations to the just criticism of professional men, I leave it to them to decide upon a subject of so much importance as to interest every class of the community.

Among the numerous authors, both native and foreign, that I have been obliged to consult before writing,* I have not found any, who did not seemingly present some system founded on their own personal observation; they abandon themselves to reasonings more or less specious, forsaking the paths of experience to follow the vagaries of their imaginations. Others do not fully explain themselves on this point; they elude the subject and seem afraid to grapple with it.

Sprengel has justly remarked, that the road to experience is

* I have employed some moments of my leisure to translate the works of Hunter and Fox upon the human teeth. My intention, at first, was to publish them, but having found in them so many opinions, and so many things which do not accord with our actual knowledge of physiology, that I regard them only as good sources from which to derive information, but whose engravings constitute their greatest value.

hard to tread, for it is easier to follow the suggestions of fancy, and by an unvaried routine, to acquire a certain amount of practical skill, than to confine oneself to the narrow and thorny path of observation.

These principles may be applied to the treatment of second dentition; it is much easier to extract the teeth, than to determine whether it is absolutely necessary. The extraction of a tooth requires nothing more, on the part of the practitioner, than a certain degree of facility in the use of the instruments that are usually employed in this operation; whilst the knowledge necessary to appreciate the consequences can only be acquired by time and study.

Fauchard, Jourdain, Bourdet, and other writers of a more modern date, have treated this point with a sort of indifference unfortunate for the profession, and painful to him who expects to find in the works of these learned dentists something which will at least instruct him.

In his *Dentiste de la Jeunisse*, so finely written, M. Duval has shown great literary talents; but his work seems rather to be designed for the public at large than for men of the profession. The author, believing that his professional brethren were as learned as himself, has not taught them precisely what he should have known so well how to teach; he has not mentioned how very necessary it is in order to assist dentition, that the means should be varied according to circumstances.

In another work excellent in many respects, he has not reckoned among the dangers of extraction the imperfect configuration of the dental arch, and the destruction of the germs of the adult teeth, the common result of improper extraction, and which a practitioner of his merit could not have failed to observe.

Dionis Bunon, l'Ecluse, Bourdet, and many that have written since their time, have adopted a system entirely opposed to the tendency of nature.

There are, nevertheless, two modern authors to whom we are indebted for some excellent articles on this point, these writers are Messieurs La Forgue and Gariot, still they have but touched upon a subject that should have occupied a much greater space in their works.

Hunter has not said any thing about it. Fox, professor of dentistry in the London hospital, has left us a very fine treatise upon his profession; but, forgetful of the manner in which he has followed the expansion of the teeth at every period of life, instead of making a judicious application of what he has said, in order to establish some useful system to aid dentition, he devotes himself entirely to a theory that involves himself in error.

In a little work, embellished with colored engravings, which I published in 1816. I have thrown out a few suggestions on the best method to be pursued in the management of the teeth; but as this pamphlet was rather designed for the general reader, and as I was desirous to be otherwise employed in so small a volume, I have been content to confine myself to principles without entering into details.

Finally, the last French anatomist that knew what he wrote, has entitled his work *Nouvelle Theorie de la Dentition;* but he has not said one word about the means that should be employed to regulate the denture. The title of his work gives us a right to expect this information; there are,without doubt, many excellent passages; but we perceive with regret, various discoveries, both national and foreign, ancient as well as modern, announced as his own. And often absurd hypotheses, and the most ridiculous stories palmed off for truth on the good faith of the world.*

Although the utility of a work, in which the different opinions of these authors should be impartially discussed, has, for many years, appeared incontestible, and although I have collected many notes on this subject, yet believing the task was too great for me, I have for a long time hesitated to arrange them. Nevertheless the necessity of instructing our young practitioners on the choice of means to regulate second dentition, has triumphed over the repugnance I have felt to attack received opinions, and a mode of treatment sanctioned by time and supported by the most celebrated authors.

In order, therefore, to contend with success against so great authorities, I must be read without prejudice, and by those who

* M. Miel, surgeon dentist, justly thinks, that the work of M. Serres is filled with errors and mere suppositions, which he proposes to notice.

will be disposed to examine the physiological facts that I oppose to those theories which I think proper to controvert. I ought, accordingly, before presenting the natural method for aiding the arrangement of the dental arch at the time of molting the primitive or temporary teeth, to review the phenomena displayed in the formation of the second teeth, as well as in the progressive enlargement of the jaw, until the termination of the second dentition.

In no country has the anatomy of the teeth met with so much care and attention as in England. Hunter, Blake, Monroe and Fox are those to whom the profession is under the greatest obligations on this subject. Their works abound in excellent engravings; the examination of which shows how much the manner of nourishing and tending the infant, in the very beginning of life, influences the health of the second teeth.

Hippocrates has said, that the health of the child, depends on the health of the mother. In truth the physical part of man resembles the vegetables that assimilate to themselves the juices of extraneous substances. If, at the period of development, the fœtus is possessed of the right principles, it will increase with ease, and all its parts will be harmoniously arranged. If, on the contrary, the pregnant female has been weakened by disease, or if she is of a naturally weak constitution, her offspring will almost assuredly have a delicate complexion; and all its organs will be rather half formed than well made, and they will need in a manner, to be renewed, during life, by nutrition.

Unfortunately the teeth when they are once formed, are, by reason of their compactness, of all the parts of our body, the most slow to obey the general laws of vital decomposition and recomposition; especially the enamel, which, although it is nourished, and may be hardened while life remains, yet it can never be reproduced, when once it has been either wholly or in part destroyed. Hence it results, that, if the juices which have been furnished these small bones, during their formation, are of an unwholesome nature; they will for a long time have a tendency to decay; still the individual who has been born with a weak constitution may become strong during his accretion.—*Jourdain.*

The dissections made by various anatomists, have demonstrated, that the first or milk teeth are generally formed at the period of birth.—*Hippocrates.*

If, on the little stranger coming into the world, its fluids do not contain a sufficient quantity of the calcareous materials which are designed to form the solid parts of the milk teeth, these will be liable to decay during the early periods of life.

If the case is the same with the teeth of the second dentition; if the child continues feeble during the expansion of the teeth that belong to this class, they will contain a great quantity of gelatine, and be exposed to *odonto-malaxia.*

But if, during the ossification of the second teeth, the child is robust, if it does not experience those diseases that impair the qualities of its fluids, or if born feeble, it afterwards becomes strong, it will most undoubtedly have good teeth; the contrary will be the case with the child, which having been born strong, afterwards becomes diseased. These observations are sufficient to shake the faith of those who are persuaded that the daily cleaning of the teeth causes them to decay, as well as that of those, who, on the other hand, believe that the observance of this will invariably prevent the teeth from becoming affected with caries.

This question, with the knowledge of these phenomena which these organs exhibit, during their development, can be very easily resolved; and it can be established on sound principles, that continued cleansing, preserves the teeth that are naturally good, whilst the most assiduous care will not prevent caries attacking those, whose very nature is vitiated by the calcareous material. Happy in this case, will it be, if the subject be aware of the bad quality of his teeth, and has recourse in time, to professional aid, which alone can retard the decay.

Consequently, the physician, by inspecting the teeth, can, in a certain degree, judge of the natural constitution of the individual, and the knowledge thus acquired may influence him with advantage, as to the mode of treatment he will adopt in the various cases of disease.

In fine, teeth originally good, may in the course of time decay; but with a little practice, the physician will easily be enabled to distinguish between those that are naturally bad and those that have become so.

The same great changes and superficial marks which we observe on the teeth of those who have been attacked with violent disease, are also frequently seen on the mucous membranes during the periods of youth ; these spots constitute what are called atrophy and erosion of the enamel, and their situation more or less removed from the cutting edges, indicate the time of life at which the disease has deranged the operations of nature.

The dentist, it is true, is sometimes able, when the disease is slight and the crowns of the teeth are above the sockets, to remedy these disorders ; but this is only when he perceives them ; it belongs to the physician alone to foresee and to prescribe the necessary means to be used by mothers and nurses to prevent these decays.

Bunon, page 61, thinks that erosion proceeds from a humor that insinuates itself into the alveolus and diseases the enamel of the tooth. The physiology of his time admits this explanation, which, if not strictly correct, approaches very near the truth.

This article of his work, is enriched with many just observations on the method of discovering by an inspection of the teeth affected with erosion, at what age the child was affected with the disorder that corroded these organs. But Bourdet, who wrote after him, has explained the mechanism of erosion much better ; he says, "that the liquor contained in the dental sac or matrix, in some cases of violent disease, acidulates, and that in consequence, the teeth are affected with erosion."—Bourdet, page 79, ed. 1758. Experience demonstrates the truth of this exposition.

M. Duval has substituted the name of atrophy for that of erosion, (Bulletin de l'Ecole de Medecine,) but this is only a change of names ; it appears to me that either one is admissible, not to designate one and the same affection, but to distinguish two very different diseases that may appear either at different periods or at the same time on the same individual.

Each of these present various characteristics, that do not permit them to be confounded.

Congenital atrophy is very frequently seen on only one tooth, whilst all the rest are sound.

Congenital erosion always lights on a series of teeth, and this kind of decay is quite common. Atrophy is more rarely observed.

Notwithstanding what Hunter and other learned men, among whom is M. Cuvier, have written on this subject, I have intimated my conviction, that the enamel forms an integral part of the tooth, that it proceeds from the dental embryo, and that consequently, does not result from a superposed crystallization, nor does it remain in suspension in the liquor which is enclosed in the dental matrix.

It is certain, that a very small quantity of vascular tissue enters into the composition of the enamel; its presence may easily be demonstrated by a well conducted analysis.

I suppose, therefore, that the dental embryo is placed in the part where the enamel must be formed, and that there is an immense quantity of small exhalent vessels, forming a sort of imperceptible velvet. By degrees, these small tubes receive the phosphate of lime, that fills them without destroying the organic sensibility, which they for a long time retain and do not lose until their place is usurped by the terreous substance that is continually conveyed to them during life; but, before the enamel is formed, a bony coat, somewhat like mother of pearl, developes itself, which is of remarkable density, and is found only on the crown of the tooth; this then receives the sulphate of lime that passes over its surface, and which at the same time perhaps undergoes some preparation. This coat, by reason of its hardness and the closeness of the tissue, may appear to be impermable, but do not the animal and vegetable kingdoms furnish us with numerous examples, where the circulation is carried on, although our nicest instruments cannot detect any vessels.

Will any one, for example, assert that there is no room for the circulation of sap in the iron tree, whose hardness is proverbial, or even in the knots of our indigenous trees, whose hard surface blunts the steely edge with which we strike them? Now, if circulation is proved to exist in the most compact vege-

tables, why may it not also be supposed to exist in the teeth, that have the advantage of belonging to the animal kingdom?

Such is the formation of this pearly covering, whose hardness is so remarkable as to have induced Hunter to suppose that the enamel was deposited by the internal membrane of the dental capsule.

As to the rest, Jourdain, in his essay, observes, that the enamel and the layer of which I have been speaking are simultaneously formed.

If we admit the mode of formation that I have just described, we can account for the changes of color, consistence and sensibility that are observed in the enamel, and which are nothing more than the result of nutrition. By this, too, we may explain its diseases. In truth, the caries to which it is exposed, and which is a sort of ulcer on the tooth, can only commit its ravages on organized parts; its being set on edge; its being often worn half away, and its being subject to accidental erosion, all go to prove vital sensibility to be here. This every surgeon dentist fully comprehends, and can here triumphantly refute those merely scientific reasonings which must ever fall before impartial experience.

Atrophy to me appears to be the result of nutrition, or of a vicious development of the small exhalent tubes just mentioned, and which constitutes an organic defect.

There is another sort different from this; it is the partial and casual destruction of some crystals in the enamel, which were primitively very well organized.

I will here state what I myself have frequently seen, and what surgeon dentists also every day observe. They are consulted first in behalf of children whose enamel on one tooth or more, although very smooth and polished, is of a brown or pale color, and perfectly insensible to the action of the instrument that breaks it. This is congenital atrophy.

Again, they are called upon by persons who have received a blow on a sound tooth, which, in consequence, has caused a part of the enamel to change its color, and upon it is found a white spot of greater or less extent. This is accidental atrophy.

If we examine the relative hardness of the enamel thus de-

scribed, we shall find it much softer in the places diseased having there been reduced to the state of carbonate of lime by the interior absorption of the small quantity of gelatin that enters into the composition of its crystals. Thus absorption acts on the enamel and on the teeth, as on the other bones; and in proof of which, I might adduce other arguments equally convincing.

Erosion should not be confounded with atrophy, which is occasioned by the death of a greater or less number of the exhalents that furnish the enamel, and the destruction of which may have happened before or after birth.

The other is the destruction of the enamel after it is formed. This is the result of the corroding action of the mucous fluids, in the midst of which the crown of the tooth unfolds itself, and whose quality varies according to the various states of health and disease.

On opening the jaws of children that have died of vermicular, mucous or mesenteric diseases, I have generally found the teeth affected with atrophy, not only on the enamel, but also on some part of the osseous substance; some of the germs were also so disordered as would lead one to suppose that they were no longer able to be charged with the calcareous phosphate.

I have sometimes seen the enamel unequally distributed over the crowns of several teeth; this constitutes those gibbosities that should of right be classed under atrophy.

Erosion confines itself to the enamel, and as I have before remarked, it ordinarily shows itself on a series of teeth; it is frequently seen in the cases of those who, during the time of enamelling, have been attacked by small-pox or some other violent disease, or whose mucous membranes have been affected.

In cases of children that have been sick, the part of the tooth that has been formed before the disease is frequently sound, though situated in the midst of disordered fluids, whence I have concluded that the action of this fluid is the more fatal to the enamel as the enamel is the more recent, so that its dissolution may gradually happen, as it is deposited by the vessels of the germ in a state of disease, and consequently before it has acquired that degree of aggregation and consistence which is necessary in

order to resist the acidulated mucus that surrounds it. To assure myself of the acidity, I placed this mucus upon blue paper died with the turnsole, the color of which, on touching the mucus, was immediately changed to a red, the more marked as the teeth appeared to be the more strongly corroded.*

The experiments which I have made present the following results. Whenever an infant has been sick of a disease by which the mucous system is principally affected, and whose progress has been rapid, the erosion will engrave a horizontal line upon the enamel of the teeth. If there have been relapses, several lines may be observed. If the malady has been of very long continuance, the enamel will be destroyed in different places, or pierced through in small holes. In the last case, the depth of the enamel will vary according to the length of time the cause may have continued.

If we now examine the differences between erosion and atrophy in the case of an infant that has been freed from a disease that has so sadly marked its teeth, we shall find that the part atrophied is deformed and deprived of the enamel; that the teeth are yellow and sensitive, and that the touch of the finger upon the part affected is very painful.

If the erosion has not wholly destroyed the crystals of the enamel, the bottom of it is of a white color, and on its being touched, causes no disagreeable sensation; if, on the contrary, the crystals are destroyed down to the tooth, the part thus denuded is irritable. In fine, congenital atrophy and erosion are very painful at first, but they gradually cease to be so as age comes on.

Erosion demonstrates that the enamel is an emanation of the tooth, for were we to suppose that the membrane secretes it, we should be compelled to admit that, if sickness for a time disturbed its functions, the act of enamelling would only be suspended, and that when the malady ceased, the membrane would produce anew the calcareous material.

*Jourdain had before observed that the mucus of the membrane, in a sound state, changed but little the blue paper; but it, in a diseased state, is the more decided.

But were this so, the part of the tooth which has been formed during the disease, and which has not been enamelled, would necessarily become so by the return of the rudiments of the enamel. The holes would be closed, and the decay entirely effaced.

We now see that if we adopt the method of enamelling, explained by Hunter, Fox and others, we cannot account for the formation of these natural marks; this doctrine, therefore, should not be received by physiologists.

All the teeth that are in a state of ossification, when the causes of erosion show themselves, are ordinarily affected, but in different places, according to their degree of elevation in the dental matrix.

Thus, supposing a child, at the age of twelve or eighteen months, attacked by a mucous disease, there will then be in each jaw the four incisors, the two canine, and the first great permanent molars, that will be affected on their edges or grinding surfaces, and also about their crowns, if their development be far advanced; and if, at this period, there still remain some of the temporary teeth that have not yet pierced the gum, their crowns will also be affected.

If the disease commits its ravages at the age of four or five, there then will be the bicuspides and the two permanent molars, whose grinding surfaces will be injured, while the crowns of the six anterior that are entirely enamelled will be either not at all or very slightly impaired, unless the disease has been so violent as to acidulate the liquor contained in the matrices, and in which case, the crowns will be almost wholly pierced through by the erosion.

The teeth most subject to erosion are the incisors, the canine and the first great molars.

The small molars are less frequently attacked. We may account for this difference by observing that the gums of those teeth do not begin to be covered with the osseous pellicule before the third or fourth year, while the diseases that disorder the enamel generally appear during the first two years of existence.

I have frequently observed that erosion has appeared in adults affected with those diseases, during the continuance of which

the mucus of the mouth supplies a humor that corrodes teeth whose enamel is very sound. Of the numerous examples I might adduce, I will give but one.

Madame la Baronne D****y, of a slightly bilious temperament, but of a good constitution, having excellent teeth, was seized in the year 1815 with a slight catarrh on the breast. By degrees it became chronic, and was accompanied with intermitting fever. These symptoms continued for about two years; during which time, she consulted me concerning a very remarkable sensitiveness, such as she had never before experienced, of the teeth.

Her gums, which were ordinarily fresh and rosy, appeared pale, with a small streak of red that surrounded the teeth. A small quantity of mucus adhered to the crowns, and here they were excessively sensitive. The saliva was very mucus and stringy.

The proper medicines, skilfully administered, removed the general symptoms, and the teeth, whose crowns had become very much corroded, especially those on one side of the mouth, were frequently touched with sulphate of zinc.

After six months, the health of this lady was restored to its former state, and her teeth were also cured.

There can be no doubt that this affection of the teeth was a simple erosion, occasioned by the acidulation of the mucous fluids of the mouth.

This erosion should not be considered a caries, but should be classed among those cases that I have frequently observed after putrid fevers.

Finally, there is a kind of erosion, well described by Fox, which results from an increased absorbing action in some parts of the mucous membrane of the mouth; it is presented to the eye under the appearance of attrition from friction on the anterior face of the teeth. I have observed, that in individuals who frequently partake of warm liquids, as the English and Hollanders, who make frequent use of tea, are very subject to this disorder.

This erosion should be distinguished from the wear of the enamel, which is observed on the teeth of those who use dentifrices, whether terreous or acid, and apply brushes to their teeth several times every day.

Various authors attribute erosion and atrophy of the teeth to a ricketty disease. But who can, without prejudice, entertain such an opinion, when he reflects that the rickets have been defined to be a disease unknown in its origin, but whose result is the curvature of the spine and some of the larger bones, their softness having determined their decay.

Let us examine if there be any analogy between these disorders and those which are seen upon the teeth.

We sometimes, indeed, find the porphyry of these corroded, but the disease either before or after birth, of which we have spoken, have caused these changes. They do not especially appear on those that have the rickets. The texture of the tooth is not softer than ordinary.

Thus even if we acknowledge that the teeth of these subjects may be attacked by erosion, it is nothing more than happens from disease entirely different from the rickets.

Having had frequent occasion to examine ricketty children, I have observed that, for the most part, they have very large heads, broad palates, and teeth of very great power; this has led me to propose to myself the following questions, which I shall not attempt to answer.

Is not the rickets the result of a vicious and unequal distribution of the vital principle that governs the harmony of the organization, and does not this unknown stimulant, being carried towards the head, attract there an excess of nutrition, which causes the bones of that part to acquire a remarkable breadth and thickness, whilst the others languish and receive scarcely enough for their accretion?

Does not osteo-malaxia, that is so frequently met with, and the phenomena of which are so remarkable, intimate some disorder of the exhalents that enter into the composition of these bones, or, at least, an increase of sensibility in the absorbents that supply them with their solid part; and, in either case, do not the rickets and osteo-malaxia, which are commonly believed to be one and the same, constitute, in fact, two very distinct diseases?

CHAPTER II.

DISPOSITION OF THE ADULT TEETH IN THE INTERIOR OF THE JAWS—DENTAL MATRICES, AND THEIR APPENDAGES—ALVEOLAR PROCESSES—ITER DENTIS—ODONTOID.

As temporary dentition is first perceived in the lower jaw, so it is here that we meet with the first traces of ossification of the adult teeth. The same phenomena do not delay to appear in the upper jaw.

In the first months that follow birth, about the fourth or sixth of life, may be discovered some osseous and enamelled points; these are the edges of the incisors, and the peaks of the two great molars of second dentition. These small bony shells are formed upon a pulpous body called the germs,* but which I here designate by the name of ganglion or dental embryo.

* Heister, in his Anatomy, says, that the jaws of the fœtus, at the time of accouchement, contain fifty-two germs of teeth, including those of the milk. M. Serres, therefore, is wrong, when he assures us that, *it was reserved for him to demonstrate their existence at this period.* As to the rest, learned men have long since admitted that the ovis contains all the rudiments of the individuals which are there to be developed, but our senses cannot distinguish their different parts, nothing more is seen of them than an unformed mucus, though each particle may nevertheless be destined to form an organ.

The pen of Bonnet has, to our minds, described the development of the germs with admirable nicety. *Contemplation of Nature.*

He compares them to the buds of trees, whose small tubes, collected at first in clusters, unrol themselves, augment in size, and increase in extent and consistence, in order to form leaves, having a greater or less extension.

This ingenious idea, applicable to the germs in general, is especially so to those of the teeth, which first, mucus, assume by degrees their consistence, are then covered with osseous shells on the extremities that are to form crowns, and when these are completed, their roots result from the extension and unravelling of the vessels which gradually become osseous. The embryos of the teeth then pass through several states before they arrive at this last;

At the eighth month, we find, on each jaw, four incisors, two canine, and two great molars, in a state of ossification. The embryo of the two bicuspidi are never well distinguished until about the ninth or tenth month, and frequently even later; while ossification is not here observed until between the second and fourth years of life, and sometimes even at a later period. These nevertheless, most commonly shoot up before the cuspidi or canine, as I have already remarked in 1806, in my thesis of reception. Fox has had several plates engraved, in which this development is followed with great exactness.*

The first adult molars are formed at the same time as the incisors; they shoot up at five and a half or six years.

At about three and a half or four years from birth, we first observe the commencement of ossification in the two molars, which show themselves above the gum at the twelfth year.

The time for the ossification of each tooth, is, therefore, for the incisors, about the seventh year, for the cuspides, the eleventh, for the bicuspidi, the tenth, and the sixth or eight for the great molars.

The increase of the teeth being in a horizontal direction,

and if authors do not always appear to agree when speaking of them, it is because the word germ conveys an abstract idea of a body containing the rudiments of an existence that may be considered under different aspects, and when *physiognomy* (pardon the expression) is susceptible of different changes. Those, therefore, who have written on the formation of the teeth, having observed that they are of little interest until the moment at which ossification commences, have only described them at this period as only being then capable of engaging the attention of the anatomist; it is for this reason that they have not sketched the germs of the bicuspides before the age of three or four years, when it is, in effect, about this period, that ossification there manifests itself. But does it then follow that they were ignorant of the previous existence of the *germs of these teeth*, in a ganglional or pulpous state. Vide, the engravings of Hunter, Fox, and also my Odontologia.

* How is it then that M. Serres is assured that he was the first who remarked it? He says, moreover, that *the molars always shoot up before the canine*, which is an error too marked to be passed over in silence. As to the others, Hunter, page 78, Fox, M. Marjolin, *Traite de Anatomie*. Bourdet, page 31; Beaumes, and finally almost all others say, that the canine often come before the molars.

those whose summits are nearest the gum at the time of their formation, are those which first shoot up; and those which have the greatest length are thus the longest time in acquiring perfection. This can easily be verified.

The canine that are formed at the first periods of life, and whose roots are not yet terminated at the fifth year, show themselves about the eleventh or twelfth year, and almost the same time with the two permanent molars, although these two last do not begin to be ossified until several years after the former.

When the dentes sapientiæ should exist, we find their first solid rudiments at the eighth or twelfth year; but in earliest infancy we may discern their germs, especially in a carefully injected jaw, by tracing the vessels that are carried through the germs to the small dental matrices.

To follow odontophia* more in detail, let us furnish ourselves with a burine, and supplied with a good glass and a great deal of patience, starting from the mediary line, let us raise the internal lamina on one side of the inferior maxillary bone taken from an infant of three or four years old, and whose carotids we shall inject with some very light composition; carefully disposing of the gummy covering during the dissection, we shall then observe what follows.

Near the symphysis, perpendicularly and deeply underneath the temporary incisors, whose roots, at this period, are incomplete, we shall find the crowns of the central incisors of replacement. The lateral incisor is behind, situated obliquely from the outside of the inside of the jaw, and covers a third of the posterior labial part of the central incisor, and about a half of the cuspid or canine. This last is situated lower, more deeply and further on them than the one just mentioned, and lies obliquely on the medial line, so that the three teeth form a triangular group, resembling that which we make with our last three fingers, in touching an annular index bring thus the middle one above the rank. At a little distance from the cuspidi, and im-

* The Greeks appear to me to have used the word *odontocia* to express both the increase and the shooting up of the teeth. I have here used it to avoid coining a word, and I intend it to be synonymus with formation of the teeth.

mediately between the roots of the temporary molars, we find the bicuspidi enveloped in their membranes, an appendage of which is carried backward to reach the gum, so that the bicuspidi appear to be covered by the crowns of the milk molars. Each kind of teeth thus ossified, can be distinguished by their points; the incisors may be known by the three small tubercles that surmount the cutting edge of each, the cuspides by one alone that forms the summit of a cone, the bicuspidi by two ossified points, and the molars by four. As ossification gradually covers the pulp or dental ganglion, their points are united and form a sort of chapeau that may easily be detached, though intimately united to it, but by vessels of so delicate a nature that the least effort breaks them.

We may understand the order in which each series of teeth is placed, by taking for a comparison the ellipsis described by the gums; then drawing in our imagination three horizontal lines upon it, which shall be parallel to it, and pass over the summits of the teeth in ossification; at four years after birth, we shall find the central incisors upon the level of the second molars, the lateral incisors upon that of the first molars and the bicuspidi; while the cuspidi occupy the lowest line; this is worthy of our special notice.

These two classes of teeth, the temporary and permanent, are therefore developed at nearly the same period; but it is only when the first adorns the mouth of the child, that nature directs all her efforts to those that are to succeed them.

This attentive anatomical observation has not only shown us that the crowns of the teeth are formed at a very early period, but also, how, from the time of their manifestation, they take their transverse dimensions, such as they should have through the whole course of life, and that the portion of the circle, which the six anteriors occupy in the jaw, is at first of very limited extent, in order to allow them to be arranged at the side of each other. Nature has so disposed of them that each covers about one-third of another which is precisely such an arrangement as we observe in the tiles upon houses. This disposition gives them such an obliquity, that supposed lines traversing their greatest diameter would cut the maxillary bone obliquely.

This arrangement of the teeth is found in all jaws; it is symmetrical, it is constant, and may be observed in all young subjects; it is a law from which nature never can and never does depart; it is, in short, an ingenious means employed by her to supply the want of space. Many writers either have not appreciated the importance of these imbrications, or have not sufficiently studied, on different subjects, what they have pleased to consider as irregularities resulting from a mal-formation of the jaw. Many mistakes in practice have resulted from this error.

Teeth do not vegetate like some grain in the earth. The Creator has provided for their development, with that wisdom which presides over the completion of all his works; they have certain connections with the surrounding parts.

All the authors that have written on the dental organs, acknowledge that these were at first gelatinous, that then they took the color and consistence of certain glands, that they enjoyed an exquisite sensibility, and that they were separated from the surrounding parts, by membranous partitions, or sort of small sacs, in which they were enclosed.

It would seem that nothing were easier than to discover the dispositions of the teeth. Each writer on the subject has, nevertheless, presented us a description of it, which differs from that given by another.

It appears to me that it would be instructive to place here, as it were side by side, the different opinions of these authors, and to make a sketch of the dental sac according to the ideas which such of these learned men have formed of it.

Hunter, in speaking of the dental pulps, thus expresses himself, (page 86, orig. Eng.)

They are surrounded by a membrane that is not attached to them, excepting at their roots or surface of adhesion; this membrane adheres at its outer surface all around the bony cavity of the jaw, and also to the gum where it covers the alveoli. * * * * * We find it to be made up of two lamellæ, an external and an internal. "The external is soft and spongy, without any vessels; the other is much finer, and extremely vascular, its vessels coming from those that go to the pulp of the tooth. * * * * When

the tooth *cuts the gum*, this membrane or capsule is *likewise perforated*, after which it begins to waste, and is entirely gone by the time the tooth is fully formed, for the lower part of the membrane continues to adhere to the neck of the tooth, which has now risen as high as the edge of the gum." Speaking of the periosteum, he says, "only the crowns of the teeth are covered with the enamel, but their roots have, instead of it, a membrane, which, though it is very delicate, is vascular, and appears to be common to the roots that it surrounds, and to the alveolus that it lines. It extends a little higher on the tooth than the alveolus, having arrived there, is attached to the gum."

Jourdain, in his excellent little treatise on the formation of the teeth, has explained himself in the following manner: "It is necessary, in order to be satisfied of the existence of the matrix of the tooth and its appurtenances, to clear the maxillary bones of all that substance which we call the gum, we shall then find *below this substance*, a very fine membrane, that is fungus at first, and of a very loose texture; we call this membrane (maxillary) periosteum, for it is attached to those bones to which it serves as an envelope."

This membrane or periosteum, by means of a vast number of fillets that pierce the proper substance of the maxillary bone, communicate with another *membrane of the same nature, produced by the expansion of the internal maxillary nervous fibres.* This membrane *occupies the internal part of the alveoli*, and whose fibres are at the alveolar edges, first unites to those of the first or *internal*, (maxillary periosteum,) serves as a matrix to the tooth, and then, according to the general progression of the osseous parts, clothes the roots of the teeth and penetrates into the partitions of the spongy tissue." This is what he, a little further on, designates under the name of internal periosteum.

We see by this exposition, which after much labor I have been enabled to understand, that Jourdain admits but one membrane *to form the matrix*, and which is not carried back to line the alveolus.

Fox expresses himself thus, page 19:

"Each pulp is covered by a membrane, strongly attached to the gum, and to the pulp at its base, so that the pulp at its edge is

loosely contained within the membrane, which is only reflected over it; at the base the pulp is weakly connected with the alveolar cavity in the jaw.

"When a jaw has been minutely injected, we find that the pulps are vascular, and also the membranes by which they are enveloped. These membranes may, with care, be separated into two *lamellæ*, the external of which is rather of a loose and spongy texture, and possessed of vascularity; the internal *lamellæ* is more smooth and is also vascular; the membranes derive their vessels from the gums, and the pulps receive theirs from the artery which passes through the jaw.

"Some preparations, in the injection of which I have very happily succeeded, fully warrant the above statement in all its variations from those of Mr. Hunter or Dr. Blake, the author of an inaugural dissertation, published in Edinburg in 1798, containing many excellent physiological remarks on the formation of the teeth. Mr. Hunter observes, that the external membrane is soft and spongy, the other much finer, and extremely vascular. Dr. Blake says: "They (the membranes) can easily be separated into two *lamellæ*, the external of which is spongy and full of vessels; the internal one is more tender and delicate, and seems to contain no vessels capable of conveying red blood.

"In the various preparations that I have made, both upon the human subject and upon calves, *I have found that both of the lamellæ* are vascular."

At page 33, Fox observes: "The teeth are attached to the alveolar cavity by a strong periosteum, which is extended over the fangs, and which also lines the socket; it is connected to the gums at the neck of the tooth, and is vascular like the periosteum of other parts of the body."

In order rightly to understand what Fox has written, we must refer to the plates attached to his work. We there find that he admits two membranes; the internal, which serves as a dental matrix, is successively continued over the root of the tooth to form its periosteum, while at the same time it becomes that of the alveolar.

In speaking of the disposition of the dental membrane, Bichat, in his General Anatomy, pages 90 and 91, says: "The mem-

brane, that serves as an envelope or follicle (dental embryo) forms a sac without an aperture, which at first lines all the sides of the alveolus, to which it, through its prolongation, clings. Having arrived at the place where the nerves and vessels penetrate, this sac abandons the alveolus, becomes free, is turned in, forms a canal that accompanies the vascular and nervous packet, and finally expands itself upon the pulp of the tooth that terminates this packet. Hence it results that this membrane has the same general conformation as the serous membrane."

Bichat, in the description which he has given, recognises but one membrane, which, after it has lined the alveolus, is turned in to envelope the extension of the dental embryo, to which it finally adheres.

He has not reflected, in admitting, page 91, "*That it is upon the portion of the membrane that covers the pulp, and upon the surface of its floating extremity, that the first osseous point shows itself.*" That he must, of necessity, presume that this membrane which he says envelopes, and directly adheres to the whole surface of the pulpous embryo, becomes osseous before the least atom of phosphate of lime is observed in the embryo itself. But were this so, as soon as its surface had become ossified, the embryo would be no longer covered with a membrane; now anatomical examination proves the contrary, for at whatever period we examine it, either when no portion of it is ossified, or when the greater part of it has become so, it appears to be wholly enveloped in a very fine membrane, to which it firmly adheres, and it is this which has led our author into error. He was forced to account for this phenomena, by admitting, what I also believe, and what I shall hereafter prove, that the dental embryo is charged larger and larger, and from its external to its internal surface, at first in its membranes that only arrive at an osseous state by passing through the intermediary states, even as do the other solid parts.

M. Cuvier, in his Comparative Anatomy, page 114, and following, has given a description of the dental matrix; from which I shall extract the most striking pages:

"The teeth," says he, "are formed in membranous capsules contained in the alveoli. The alveoli are, at first, round cavities, lined with a periosteum, that is nothing more than a con-

tinuation of that which covers the jaw. * * * * * The capsule of each tooth is attached at its base to the bottom of the alveolus by means of a series of vessels which are carried to it from the dental canal, and at its summit to the gum that covers the jaw, by means of a compact calluosity; *as to the rest, it is loose in every part.*

"This capsule is divided into two membranes, the interior of which is stronger and dryer, and the exterior is softer. This entirely assumes the same curvatures as the tooth, and when the tooth is formed, this interior membrane penetrates into all its cavities, and garnishes all its furrows."

"The whole interior of the capsule is filled with a gelatinous pulp, that forms the rudiments of the future tooth, and is fastened only at its base to the capsule, by means of the vessels and nerves, of which I have just spoken. The rest of its surface, though contingent, is not attached to the capsule.

"The production of the root is owing to the pulpous stone not adhering to the bottom of the capsule, &c.

"The enamel does not cover the roots, because the internal lamina of the capsule, which alone can produce it, does not extend there."

Let us now see what M. Serres says of it.

The membrane that envelopes the germs of the teeth, and in the interior of which these bones are developed, has a structure and distribution that are peculiar to it, *and which have not yet been explained.*

"This envelope of the tooth is composed of two lamina, the one external and the other internal, distinct not only in their distribution, but also in their structure and functions.

"The external *lamella* is opaque, whitish, and of a fibrous nature; *in one part it lines the alveoli*, and serves as their periosteum; in another, it is applied to the external surface of the internal lamina. Adhering, in its inferior part, to the dental nerves and vessels, it is united, as we have before remarked, to the cartilage of the gums, and when the tooth has made for itself a passage through them, it encompasses its neck. It possesses a very perceptible elasticity, and compresses the liquor in which the tooth is immersed; which, indeed, appears to be its

use, for if we make a small opening, and raise a small portion of this lamina, the internal lamina, and the liquor that fills it, *immediately suffers hernia through the aperture.*"

The internal *lamella* is very fine, transparent, and of a nature *sui generis.* * * * * * Let us now examine its distribution: on the outside, it is covered, as we have already remarked, by the internal *lamella*, with which its adherence is very firm, especially at the place where it corresponds to the fibro-cartilage of the gums. Having arrived at the spot where the vessels and nerves penetrate, it *is detached from the external lamella*, and then appears to be united to it only through the medium of the small vessels which pass from one lamina to the other. In this place the internal lamina separates from the external, is thrown from below above, and forms an envelope for the vessels and nerves until the base of the inferior circumference of the pulp, where it is inserted in a very manifest manner."

It seems to me far easier to suppose this disposition of the internal membrane than to follow it with a scalpel.

Finally, to be assured, that the figure which I have made to represent the dental sac, described by this author, is exact, it is necessary for us to read to the 70th page of his work, for at the 46th page he says, "that the teeth have no periosteum." It is probable, however, that he intends only the crowns, which, in effect, cannot be furnished with it.

Who would believe, that after having taken cognizance of the six descriptions given by the foregoing authors, and not having found one exact, I would dare undertake to give a better one. I will, nevertheless, attempt it, leaving the reader not only to judge from the engravings I have had executed*, according to the ideas furnished by each of these writers, but also urging him to repeat the experiments that have induced me to believe that some of these learned men have approached the truth, but all have in divers points departed from it.

No one of the first five has mentioned the membranous conduits, that are carried from the dental matrix to the gums, in whose surface they have an orifice. They, therefore, regard it as a pouch closed in every part. These conduits, which, for the

* These are omitted in the translation.—*Eds.*

strongest reason, I am compelled to admit, for the matrices of the molars, although we cannot there dissect them, are easily seen in the six anterior of the second dentitio.

The sixth of them has conceived the same of first dentition; but he has admitted for the second the canal, which I have also found, and which he designates under the name of *gubernaculum.*

Thus, according to him, the dental matrices of first dentition, will be very different from those of second. I have, therefore, made two engravings.

Finally, he does not acknowledge that the alveolus has a particular periosteum, which does not form a part of the matrix.

I will endeavor to dissipate the doubts that might necessarily arise from these diversities of opinion, and with scalpel, burine and glass in hand, will give my views of nature, as being the only book that cannot lead us astray.

If we only dissect the gums of very young subjects, or if we only examine one sort of teeth, as for example the molars, we cannot give an exact account of the different forms of the matrices, and the changes that take place in them; the authors I have named do not appear to have directed their attention to this circumstance, it is highly necessary, therefore, to examine those whose teeth are in different stages of accretion, that is to say, before the roots have begun to show themselves, and also when they are half formed, which not one of these authors have engraved, and it is this that leaves their readers in uncertainty.

It is also necessary to repeat the same examination, because we may at one time, observe, what at another has escaped our observation.

It is only requisite that we shall examine the maxillary bone, sometimes on the anterior, sometimes on the posterior, sometimes on the side of the gum, sometimes on the opposite side, and we shall then be enabled to ascertain what follows, in jaws finely injected.

First.—After having cut the gummy covering under which a great molar is situated, whose crown is not entirely ossified, take a lever and remove this tooth, which you will not do without an effort; because this body clings, throughout its whole surface,

to the surrounding parts by innumerable small vessels resembling a cellular, spongy tissue, from which a fluid, that seems to be albuminous, flows.

The tooth and its envelope having been taken from the alveolus, we perceive that the bottom of it is covered with a fine shining membrane, receiving numerous nerves as well as some red vessels. This membrane runs back upon the side of the alveolus. This is the proper periosteum of that cavity; repeat this examination upon another molar tooth, the half of whose root is ossified, in order to ascertain the difference.

Second preparation. Remove, with a file the osseous part of the blunt edge on the other side of the jaw, then with a very sharp burine, you may penetrate into the alveolus, being at the same time careful to have the vessels and nerves untouched. Next with your lever, take away these parts, you will also carry along with them the envelope of the tooth, and you may now distinguish the nerves and arteries, some of which are carried along the length of the internal alveolar coats, while others are carried to the tooth. After having examined these in detail, cut the trunk of the inter-maxillary nerve, and with your lever remove the matrix; you will bring along with it the gum to which it is *continuous* and from which you can only separate it by the aid of the scalpel. Repeat this operation on the molars whose roots are commenced, and also on the anterior teeth, being careful to remove all the posterior osteo-maxillar lamina; you will observe the same phenomena in the bottom of the alveolus; but the dental matrices of the teeth last named, on the side of the gum, take an elongated form and present very contracted necks, the circumferences of which also communicate with the alveolar periosteum by the aid of a vascular tissue.

In dissecting all the matrices, *(for this name, adopted by Jourdain, seems to suit those pouches which enclose the teeth,)* we observe that they are composed of two membranes.

The internal membrane proceeds from the mucus that covers and enters into the composition of the gums, and is fastened to the line that separates the crown from the root, and which we call the neck of the tooth. When the ossification has not yet commenced, it [the membrane] appears to adhere to the summit of

the embryo, which proves that it is only the neck which becomes gradually ossified, and that the crown penetrates into the proper cavity of the matrix.

This last exhales a mucous fluid, in the midst of which only the crown of the tooth is placed. This facilitates its development, and extends to the coats of the alveolus, separated from the crown, and dilates the dental matrix, in the same manner that the amnion assist the increase of the fœtus in the uterus.

The external coat of the matrix proceeds from the fibro-cartilaginous body that covers the alveolar edge and enters into the composition of the gum; enveloping the other membrane and having a very intimate connection with it, it descends to the neck of the tooth. Throughout this connection it is spongy and of a rosy appearance, because through it we see the small red vessels of the internal membrane.

Having arrived there, it abandons the other membrane, and spreads itself upon the root as this part is gradually formed, but it always envelopes the base of the still unossified ganglion, and adheres to the nerve and dental artery which cross it. This membranous partition is of a very white appearance.

It is then this membrane alone, and not both, which furnish the periosteum of the roots; and the truth of what I have here advanced, may be demonstrated by removing the membranes from the teeth of jaws injected only two or three days after birth. Before this time the softness of the parts prevents their being separated; and at a little later period they are too dry.

This dissection of the membranes that environ the tooth, necessarily leads us to divide them into two parts, one with a double coat covers the crown of the tooth, being fixed on its neck and having no other vessels than those from the gums; the other with a single coat, which adheres to the tooth from its neck to the extremities of its roots, and receives small vessels from the periosteum of the alveoli, beside those also that are furnished from the gums and the dental artery.

That portion of these two membranes, which it carries from the gums to the neck of the tooth, has for the six anterior of first dentition, an oval form. This oval figure, for the ten anterior of second dentition, approaches the *piriform*, with an elongated

neck. For the molars of second dentition, it is a sac, almost spherical and very thick on the side of the gum.

The adhering portion of the fibrous part, I mean that which surrounds the root, cannot, therefore, be considered as forming a part of the matrices, although it is continued to it.

Each matrix of the ten anteriors of second dentition, has an appendage, or narrow neck, that reaches the gum. As soon as I observed this, I supposed it was intended to serve as a conductor to the tooth, and I was fully convinced of it when I observed a small canal occupying the centre of this species of *cord.*

It is astonishing that Hunter, who has given us so excellent a treatise on the natural history of the teeth, has not indicated the appendage that binds the ten anterior dental matrices to the gum; contenting himself to observe that this [the gum] is united to the capsules, which can only be meant of the molars, whose membranes are in effect united to the gums, but these may also be rather manifest appendages, just as these are for the other teeth.

Hunter, as well as several other anatomists who have preceded him, has nevertheless remarked, that nature has furnished the small holes, that we see behind the temporary teeth, for the growth of the second.

It is probable, that commencing his researches, by separating the gum, he also cut away the appendages; and it is this that prevented him, as well as those I have just quoted, from understanding the true disposition of the membranes of the dental matrix.

Fauchard, in his Surgeon Dentist, has committed the same mistake; and Professor Beaumes, to whom we are indebted for a very good treatise on first dentition, is found in the same situation, which proves that in anatomy we should, in every sense of the word, turn to the subject.

Although the small exterior perforations of the alveoli are very observable in dry jaws, as through them the appendages issue; the coats of these are, nevertheless, so closely brought together, that it is with the greatest difficulty, we can introduce a piece of wire into the canal that occupies the centre of each. It is only after having burnt, by its immersion in weak nitric acid, the epi-

dermis of the gums, that we can uncover the small hollow places that indicate it.*

We shall find, on reflection, that the approach of the coats of the appendages is very necessary, in order to prevent the escape of the fluid contained in the matrix. Is not this also the case with the uterus, whose orifice is after conception closed?

The buccal apparatus of the appendages, then, can only be perceived when the teeth are removed, but we may, nevertheless, sometimes easily distinguish them when these are in them, and I have frequently introduced, without much effort, a pin, which struck the tooth and brought away a small quantity of mucous liquid, by which that organ is surrounded.†

If it be true, as I have said, that this small bone opens for itself a passage through the gums, we cannot perform this experiment without piercing them and causing pain to the child.

This is because the way is entirely marked out, that a tooth passes through the gums without pain, which a small exostosis raises without piercing them.‡

* This appendage had not been mentioned by authors when I spoke of it in my thesis of reception in 1806. It was engraved in my Odontology in 1815, and Fox had it represented in England in 1813.

M. Serres has, nevertheless, announced in 1813, that it was reserved for him to bring forward divers new things, and among which he mentions the discovery of the appendage of the dental sac.

We must believe that the occupations of M. Serres, have not permitted him to read the numerous modern works that treat of dentition; such as those of Bourdet, Jourdain, Gariot, Laforgue, Duval, &c., for it is probable that he then would have rendered *unto Cæsar the things that are Cæsar's.* Sprengel has said: "Erudition is useful, in order not to appropriate to ourselves the discoveries of a preceding century."

However that may be, instead of preserving the name of appendage for each of the small hollow cords, that I have described, serving as a means of communication between the dental matrices and the gums, M. Serres calls it gubernaculum, thus comparing it to the cord that directs the course of the testicle, in order to detain it in the scrotum.

This comparison is essentially adverse, as I shall presently show.

† Vide my Thesis, December 31, 1806, page 71; my Odontology, 1815, page 10.

‡ This experiment is easily performed, especially at the time of moulting the temporary cuspides.

There are, nevertheless, some which give much pain in opening the way they should follow, and sometimes determine very serious results.

The nerves and blood-vessels of the gums are carried to the dental matrix, and although they appear to be fixed in the neck of the tooth, it is nevertheless probable that in descending the length of the appendage of which they form the internal coat, they are continued to the root; but as in this part of their course they do not admit red blood, we can only distinguish them in cases of disease.

In truth, when we extract a sound tooth, its periosteum is white; but when it is diseased it is more or less inflamed.

As to the rest, the capillaries, that the periosteum receives from the gums, unite at their extremities, with those that are distributed to the alveoli, and which are furnished them by the internal artery of the maxillary bone.

The nervous branches of extreme tenuity, that are scattered in the gums, we indeed cannot follow; it is, nevertheless, certain that these accompany the vessels of which we have just been speaking.

Moreover, the coats of the alveolus, are pierced with small holes through which those small, very delicate, white vessels pass, that are carried to that part of the external membrane, which is to form the periosteum of the root. In this manner, intimate relations are established between it [the root] and the surrounding parts.

It is also presumable, that these white capillaries are mixed with the nervous fillets, by means of which the periosteum acquires that excessive sensibility which it manifests in certain circumstances. Finally, it is to the numerous anastomoses between vessels and nerves, coming from different points, that is to be attributed that vitality which the root of a tooth still enjoys, when the central nerve has been destroyed, as well as that which exists in the portion of the periosteum remaining untouched in a tooth that is very much exposed, and to which the gum no longer adheres; for in this case the alveolar vessels alone supply the juices. As regards the artery that is given to the ganglion, in order there to convey the phosphate of lime and gela-

tin, which are necessary to the increase and maintenance of the tooth: it is introduced at the extremity of the root or roots, and penetrates them obliquely at the bottom of the alveolus. The same is the case with the nerves; but before these are there introduced, the whole form a sort of star, whose numerous rays are scattered both over the periosteum and over that of the alveolus, and whose admirable net-work may easily be observed when inflammation there manifests itself.

These are the results of a great number of dissections made upon subjects, from the most tender age up to the period for the appearance of the teeth.

On analysing this description, we perceived, 1st. That the alveolar periosteum constitutes a particular membrane, that bears the relation of contiguity only and not continuity to the dental membrane. This is what M. Cuvier has observed. 2d. That these last communicate with it by means of an immense quantity of nervous, arterial and lymphatic fibres, that serve to form a most intimate union between the root of the tooth and the alveolus. This is what the majority of anatomists have observed. 3d. That there is an appendage of a greater or less length for each anterior dental matrix. This is what M. Serres has lately demonstrated. 4th. That the vessels which are conveyed to the matrices, come from different points, even as Fox and Blake have remarked. 5th. Finally, that these membranes are not without openings, but there is always one of these whose orifice is on the surface of the gums, &c.

The part, with the double coat, which is carried from the gum to the neck of the tooth, is, as we shall see, enlarged and prolonged, until the perfect completion of the crown, and is then shortened in order to be destroyed after odontocie. The other, on the contrary, is prolonged to cover the root, as this portion of the tooth gradually develops itself as odontocie proceeds.

Hunter, Bichat, and some anatomists before them, such as Colomb, Dulaurent, etc. have supposed that the fibrous membrane, which serves as a periosteum, is bent inside of the root, to serve as a sheath to the vessels that penetrate into the dental cavity and line it, as the medullaries do the large bones.

The development of the teeth is so different from that of the

other bones, that it is impossible to admit this disposition; for that which would be useless becomes impossible from the particular mode of ossification of the small organs that now engage our notice; since there is room for layers superimposed obliquely and circularly to the axis of each tooth, presenting this to our minds, the idea of small solid cups, placed one within another,* so that the part of the dental embryo, which is not yet ossified, is covered by them, and presents a nipple differing in its form according to the kind of tooth; and it is only when the ganglion has become osseous, that the vessels and nerves which occupy its centre can also be distinguished.

In the greatest number of subjects, the arterial branch, that carries the blood to the dental embryo of second dentition in the lower jaw, is single, it is nevertheless sometimes divided into two before it penetrates the hole that is seen at the bottom of the coronoid apophysis. In this case, one of the arteries is carried to the temporary teeth, whilst the other is conveyed to the embryo of the permanent teeth. But I have never had occasion to observe an analogous variety in the upper jaw. Each embryo, whether it belongs to first, or forms a part of second dentition, always appears to receive a fibre from the common branch that furnishes all the anterior teeth, and from another, that is conveyed to the molars, whatever may be the class to which they belong; for the vessels and nerves are not, as in the inferior jaw, furnished to every series of superior teeth, by one arterial branch alone.

Those which nourish the temporary molars, also support the bicuspidi, and the permanent molars, they come from an alveolar branch of the internal maxillary. The nervous fibre that serves for these teeth, proceeds from the suborbital, behind the socket. As regards the blood vessels that are distributed to the conoids and the superior incisors, either of first or second dentition, they are furnished by the suborbital, while it is still enclosed in the canal of the same name. The nervous fillet that is dispensed to these teeth proceeds from the suborbital nerve, almost as soon as this has sprung from the orifice which bears that name.

* This is a soluton from the reflections of Bichat, Anat. Gen. articles that treat of teeth.

The vascular and nervous distribution that I have just described, is well known to anatomists, and appears to me to be invariable.

L'Ecluse* and Jourdain† thought that the vessels which are conveyed to the inferior temporary teeth came constantly from one particular branch that I have described a little above. This disposition is found, it is true, on some subjects; but it is only one of those *lusi naturæ* of which the circulating system affords so great a number of examples. M. Serres, who seems to have based his *theory of dentition* on only a small number of facts, has described this irregularity, under the name of the *artery of dentition;* thus supposing that it was consistent, and believing that he was the first who had observed it, a double error, not hurtful to humanity, but which may be interesting to physiologists.

Before birth, and also during the first months of life, the matrices of the dental embryo of replacement, are in contact with those of the primitive teeth; and as these last gradually acquire their solidity, the small osseous lamina, which separate the two classes of teeth, are developed. When these lamina are not yet formed, the jaw of the fœtus presents a large groove, that by degrees, is divided into small cells, forming two ranges of alveoli, the anterior one for the temporary teeth and the posterior of those of replacement. This is the *processus alveorum* of Hunter.

In order to follow the changes that this groove experiences, it is first necessary to examine the jaw of an infant, at the time, (of accouchment,) and then compare it with that of a child of four or five years, from which we have taken all the temporary teeth, as well as all the posterior osseous lamina that cover the alveoli of the adult teeth.

During the labor of dentition, the alveoli of the teeth of replacement, assume the form of almond shells, whose extremities, facing the gum, afford orifices for small osseous canals, having an oblique direction, and being, as I have said, prepared by means of small oval holes, behind the teeth of first dentition.

* Duhamel, Memoir on the Formation of the Teeth.

† New Elements of Odontology, page 114.

I call each of these canals *iter dentis*, and they serve as cases for the appendages of the dental matrices.

During the slow progression of the tooth towards its orifice, the *iter dentis* acquires considerable capacity by the action of absorption; whilst, on the contrary, the lower coats of the alveolus, wherein the crown of the tooth is developed, are drawn together to be moulded on the root, which not being surrounded by a liquid, allows of this change, so that the part that was primitively the most spacious, in a short time becomes the most contracted, and consequently the alveolus can have a different form only when the crown of the tooth is elevated above the gum.

The author of the Physiology of the Teeth has not distinguished the *iter dentis*, from the alveolus itself. He calls the whole canal *alveolo dental.*

This denomination, it appears to me, should not be admitted by anatomists; for the alveolus ought to be distinguished from a straitened conduit. This last covers only the appendage, whilst the body of the matrix is contained in a part altogether more spacious.

The alveolus, it is true, acquires its extension on the side of the gums at the expense of the *iter dentis*, but since before its arrival there, it experiences some changes of which we shall form an idea. It is, therefore, indispensable that they should be described.

The alveolus, though the whole of it is moulded about the root, has nevertheless its own periosteum like that of the interposed tooth, consequently it is by means of these that the tooth and jaw attain the adherence necessary to the solidity of articulation. Among some animals, such for instance, as the ruminant, this double periosteum has a remarkable thickness, and hence their teeth are very movable. The alveolar cavity, when we extract a tooth, is sometimes deprived of its periosteum, at others the tooth is deprived of its periosteum also; so intimate is the union that the whole acquires.

The enamel, as long as the crown of the tooth is covered up in the alveolus and bathed by the liquor of the matrix, has not all that solidity which it afterwards acquires; we may easily re-

move it. It is chalky, and has not that semi-transparency that causes it to be distinguished by that name; this it only attains by the slow absorption of the gelatinous part that is interposed between its particles.

Men have endeavored to explain odontocie in various ways, but the progression of the tooth towards the gum, is a problem which, it appears to me, has not yet been solved; because instead of searching nature in order to learn her operations, most authors have supposed that they could divine her secrets by hypothetical reasonings.

This part of physiology can only be known from the study of the changes that take place in the surrounding parts, during the progress of the teeth towards the gummy aperture.

This study of the subject proves, that the instant in which the crown is completed, its progression commences.

This appears to be determined by many causes; it is known, 1st. By the development of the root. 2d. By the closing up of the lateral coats of the alveolus. 3d. Finally, by the increase of the osseous substance of the maxillary bone, which covers the bottom of the alveolus, or more frequently entirely elevates the gums.

We may be satisfied of what I have said by examining two lower jaws, from which the interior compact lamina has been removed, and one of which has been taken from an infant of four or five years, and the other from one adult. The alveolus, in the first, extends almost to the blunt edge. While, in the second, the alveolus and the blunt edge are separated by a considerable portion of osseous substance.

Finally, the tooth is drawn towards the gum, by a phenomenon worthy of all admiration, which consists in the contraction of the tissue of the two membranes composing the dental matrix, properly so called.

The part of the two membranes, which is, as I have said, fastened to the neck of the tooth, shortens itself by degrees and raises it towards the orifice of the matrix.

The mechanism of this, perfectly resembles what a fisherman does, when he wishes to possess himself of the fish he has caught in his net. He brings together the meshes so as to gather

them together into a pucket; and as by this means his prey is brought to him, so by the contraction of the fibres of the matrix, the neck of the tooth arrives at the level of the gums.

But from this contraction necessarily results the shrinking of the coats of the matrix, which gives room for the formation of a body of a carneous appearance, that enacts a chief part in the destruction of the roots of the temporary teeth, as we, in another place, shall show.

The progression of the crown of the teeth, having presented to me the idea of a sort of accouchment, I have adopted the word *odontocie* to express the shooting up of this bone above the gum, in following a channel that traverses its whole thickness; in such a way too, that the fibro-mucous body, as we have before taught, is neither pierced nor divided by the points that the enamelled parts of the tooth present. The route is already entirely traced; it is only therefore necessary that it should be enlarged. An infant issues from the womb of its mother in a few hours, while the teeth require many years in order to show themselves on the outside of the gums: but both alike issue by the contraction of the matrix, in which they are developed. There is nothing, therefore, unhappy in this comparison.

CHAPTER III.

ON THE APPAREL DESTINED BY NATURE FOR THE ABSORPTION OF THE ROOTS OF THE TEMPORARY TEETH.

If the teeth of man grew as their possessor gradually increased, like what is observed in some species of fish, a second dentition would not have been necessary; but this is not the case; the teeth called the temporary, having acquired their dimen-

sions, do not continue to increase any longer, whilst, on the contrary, the jaws of the fœtus are extended, by reason of the general development of the individual. These provisionary teeth that have at first lain obliquely in the fœtus, which then were ranged so agreeably to the alveolar edges of the infant, and which, until the second or third year, are placed very near each other, commenced about this period to become perfectly separated. This result of the increase of the maxillary circle, soon calls for stronger teeth that may afford less fragile means to perform mastication. Consequently, the teeth that have been silently growing behind the primitive ones, gradually announced their presence by moving these; they interpose between them, and finally force them to yield the place to themselves. This singular phenomenon, at first unknown, was then explained in various ways; and the moulting of the teeth is still, to those who see only mechanical causes, a problem that they cannot solve. Very celebrated anatomists formerly wrote that the milk teeth were without roots. This error has been shared and repeated by their cotemporary dentists, who probably did not think proper to assure themselves of the fact; yet the simplest dissection of a child's jaw would have dispensed with these useless commentaries.

Finally, it is not more than fifty years since this question was decided, and the truth known; but when it still remained to be resolved, it was remarked by some: if the milk teeth have roots, how happens it, that when they fall out we do not find them? Instead of making anatomical researches, they formerly conjectured that the crown of the milk tooth separated itself from its root, just as the horn of the stag falls from the head that bore it, and that then the root gave birth to a new tooth.

Bunon, having made several preparations to assist him to understand the subject, and having acknowledged, that the temporary and permanent teeth were perfectly independent of each other, endeavors to explain this destruction of the roots of the teeth.

This author supposed that the heat of the parts increased the action of second dentition, and the pressure which he thinks must be exerted by the crown of the permanent tooth upon the

root of the temporary, were the causes of its destruction; he conjectured, moreover, that it was either entirely consumed by the heat of the parts or carried away by the saliva.

Fauchard combats this opinion, not believing, with reason, in this mechanical pressure, but supposing this destruction results from a proper disposition of the juices of the temporary root, or from the action of the surrounding liquors.*

L'Ecluse, in 1764, pretended that the dental vessels do not any longer convey the juices to the milk teeth, whenever those of replacement have attained a certain degree of development; and hence, according to him, it follows that these small roots are broken up by a sort of maceration.

Jourdain attributes the destruction of the roots of these teeth and of the inter-alveolar partition, to several causes. 1st. To the pressure which he supposes to be exerted by the tooth of replacement. 2d. From the mechanism he adopts, he admits with Fauchard, that the osseous juices which are carried to the milk teeth by *particular vessels*, overflow in the temporary tooth, acquire there a certain acrimony, changing its color, altering its substance, disposing it to decomposition as if it were injected with an acid; and that, finally, the residuum of this dissolution disapppears without any one's knowing by what means.

All these explanations could not convince Bourdet.† He believes that the destruction of the temporary roots could not be effected by those means that these authors have indicated, and was the first to observe that the time of moulting a temporary root, we always find behind it a carneous tubercle which served as a sort of intermedial between the crown of the tooth of replacement and the root of the tooth to be replaced, so that all immediate contact was impossible. He thence concludes, that this small tubercle exhudes an acid juice, which has the property of eating up the temporary root that is nearest it. M. Laforgue, having also remarked this small fungoid body, and supposing it to possess the function assigned it by Bourdet,† designates it under the name of absorbing apparel. This, in effect, is to suppose a carneous tubercle being gradually developed before

* Bichat has shared this opinion. † Bourdet, p. 52.

the tooth, whose progression it proceeds, that continually augments in volume, and appears to consume not only the temporary root, but every thing that would oppose the march of the tooth; if it is not, what other organ is charged to do this?

Surely, the increase of the osseous channel, that I have called the *iter dentis*, and the destruction of parts so compact as the temporary teeth and the maxillary bones, can only be effected by one of those phenomena placed under the influence of life.

We have seen, a little above, that the disposition of the crowns of the teeth within the alveolus, that there is never any contact between them and surrounding parts, and that, consequently, there is no pressure. There is not, moreover, any arterial pulsation capable of destroying the neighboring organs, such as sometimes happens in the vicinity of great vessels in the case of aneurism. We cannot, then, admit an explanation of the manner of the destruction of the temporary roots that can only result from a friction, of which we have just demonstrated the impossibility.

We cannot, moreover, believe in the exuding of stagnant acid juice, for the presence of such a chemical agent would not only act upon the tooth that should be destroyed, but would, also, most indubitably cause inflammation, followed by suppuration and caries. Nature, always so provident, is bound to provide against such unhappy accidents; she, sometimes, it is true, envelopes her simplest operations in a veil, that at first appears mysterious, but which is soon drawn aside by physiological discoveries and exact researches.

On the subject of the destruction of the temporary roots, Hunter, page 99 of his Natural History of the Human Teeth, thus explains himself:

"It would be very natural to suppose, that this (wasting) was owing to a constant pressure from the rising teeth against the fangs or sockets of the first set; but it is not so, for the new alveoli raise with the new teeth, and the old alveoli decay in proportion as the fangs of the old decay, and when the first set falls out, the succeeding teeth are, so far from having destroyed, by their pressure, the parts against which they might be supposed to push, that they are still enveloped, and covered by a

compact bony socket. From this, we see the change is not produced by a mechanical pressure, but is a particular process in the animal economy."

Fox, pages 38, '9, believes that the destruction of the temporary teeth results from a pressure that is exerted by the permanent tooth upon the alveolus and upon the root of the tooth that should yield it place. The mechanism adopted by this author, though not the true one, is still very ingenious, we will see what he says on this subject.

"It has been observed, that the pulps of the new teeth are placed behind the temporary ones, and in that situation they are very much crowded and occupy but a small space. Now it is evident that as they advance in growth, they will require an increase of room, to which they must come forward, so as to form a larger circle."

This effort first produces a considerable pressure against the bony partition, placed between the temporary and permanent teeth, and upon the posterior part of the fangs of the shedding teeth. The pressure, in this instance, acts precisely in the same manner as it generally does in other cases where it is applied. It induces an absorption of the parts pressed against; and as the new teeth augment, the fore part of the socket which was formed around the pulp, and separated it from the temporary tooth is removed by the process of absorption."

Thus we see this fungy-form body has not been observed by Fox, and that his system, ingenious as it is, must, of itself, fall to pieces, when we carefully dissect the jaws of an infant of six or more years. Has M. Serres solved the problem in his *Nauville Theorie de la Dentition?* This author has promised to explain how the roots of the milk teeth are *worn away;* and he thus acquits himself: "The osseous interculary, is operated from bottom to top by *usure*,* a slow destruction, resulting from a primordial law, of which no one can assign the natural cause."

This explanation is almost literally translated from Hunter.†

A little further on, he adds: "The roots of the temporary teeth are worn away by the same law that destroys the alveolar partition."

* There cannot be *usure* where there is no attrition.

† Hunter's Natural History of the Humar Teeth, p. 99.

Finally, he supposed a vacuum is formed by the destruction of the temporary root.*

The science has gained nothing from these plausible hypotheses. If M. Serres had given himself the trouble to read the works of Bourdet and of M. M. Duvall and Laforgue, he would have seen that this law has established an organ, whose existence and functions have been conjectured by these learned dentists.

It is certain that there is not only a law, but also an agent charged by it, to effect the destruction of every thing that would form an obstacle to *odontocie;* this agent would not have been so long unknown, if physiologists, instead of employing themselves in vain reasonings, had sought to interrogate nature about the fact. For scarcely has first *odontocie* been accomplished, when second dentition, at once, prepares all its forces to destroy that under the cover of which it is developed. While the crown of the tooth of replacement is only in formation, the exterior membrane of the matrix is simply crossed by some blood vessels; but as soon as it is completed, the capillaries are then developed in a very peculiar manner, and form a tissue as fine as cobweb; from this time the internal membrane, instead of continuing to be very delicate and of a pale red color, increases in thickness and assumes a redder hue. As, was before said, it is at the instant in which commences the reaction of the coats of the matrix that are conveyed from the gum to the neck of the tooth, that the plaiting of the vessels that enter into their tissue, compose a body of carneous appearance, whose absorbents extend their empire over all the surrounding parts; it is, therefore, the dental matrix itself, that, after being dilated to serve as a protecting envelope to the tooth, is contracted not only to form this bud-like body which we find immediately below the milk-tooth, at the instant in which it naturally falls out, and whose volume is necessarily augmented as *odontocie* gradually goes on; but, also, a carneous mass by which the whole crown is surrounded, whose thickness is the more remarkable, as the organ that it envelopes is nearer its orifice.

* We find in the explication of M. Serres, a medley of the ideas of Hunter and Jourdain, to whom he is obliged to do homage.

Is there then a dissolving fluid exhaled from this that acts chemically on the surrounding parts, or do the absorbents, without any intermedial, destroy every thing that would obstruct the shooting up of the tooth? Not possessing positive proofs suitable to guide me in the decision of this question, and finding those of others of little importance, I will not attempt to answer them.

The vessels of the temporary tooth frequently remain entire in the midst of the destroying apparel by which they are surrounded. They continue to convey the juices to the central part of the tooth, whilst the calcareous phosphate and gelatine have been taken away from round about them. Sometimes they are found strangled or even destroyed.

The natural moulting of the temporary, generally happens when almost all the root has been destroyed, but, frequently, not until the interior of the crown is hollowed out in the form of a capsule: nevertheless, disease of the gums may determine its moulting, without their ever having been any absorption. Thus, whether the absorbents of the fungy-form tubercle, by a sort of suction, pump the calcareous phosphate and gelatine from the temporary root, without any previous disposition, or whether an exhaled fluid effects this decomposition, they are both carried back into the general torrent of the circulation conformably to the law of vital decomposition.*

The vessels charged with this operation are more decided in the place that borders on the temporary root. When they are very red, as if inflamed, life, in fine, strikes with reiterated strokes, employs all its energy and destroys every thing that forms an obstacle to the passage of the organ that replaces the one whose destruction has been determined on.

Force, for the performance of certain phenomena, increases in the ratio of the resistance; hence, the absorbing body is more decided, as the parts to be destroyed are thicker or more solid; for the same reason, too, it is found to be very powerful, behind

* Recent experiments made by Dr. Magendie, at Paris, and M. Mayer at Berne, prove that absorption is peculiar to the veins, and render doubtful, according to these authors, that of the lymphatic.

a milk molar, that is about to be moulted, and whose strong roots have been entirely consumed. There is not, therefore, any vacuum occasioned by the destruction of the deciduous root, as has been gratuitously supposed by a modern author, for the volume of the apparel is in direct ratio to the destruction effected, and the progress of the tooth. Nor is there any of the fragments remaining in the alveolus as Bunon remarks. The root of the tooth is absorbed in the same manner as all the parts that are touched either by the fungy-form tubercle that proceeds, or the body of the matrix itself.

There cannot be any *usure* of the temporary root by the crown of the permanent tooth, since there is no friction, this last being separated by the matrix from every thing that environs it, even until it has passed the aperture of the *iter dentis.* As soon as the crown of the temporary tooth falls out, we perceive that the permanent, which does not delay to be elevated to the same level as that which has preceded it. The dental matrix having passed through divers states, and having fulfilled the functions that were assigned it, is effaced, and leaves no other trace of its past existence than those two small eminences that delineate the festoons of the gums. If there is no room for the immediate action of the absorbing apparel upon the temporary root, which happens either when the tooth of replacement has not followed the *iter dentis*, or when the child is feeble, its destruction is not effected, and it may remain in its place during the whole period of life, though the permanent tooth sprout up not far from it.

The absorption of the root may sometimes occur, although the permanent tooth is still at a distance from it; but then the action that is performed has wholly preceded *odontocie ;* this is a new proof that it is not any mechanical action that determines the moulting of the teeth. Hunter and Fox have also noticed this fact. Thus, the latter has avowed his embarrassment in explaining absorption as the result of pressure.

There is, in my possession, a curious piece of anatomy; it is composed of a great second molar of the superior jaw, between whose roots a *dens sapientiæ* is developed. The destruction of the roots has been effected in the same way as they are in the

milk teeth; the *iter dentis* passes between them. This very rare fact proves that the annihilation of the roots of the teeth, may occur not only in the temporary, but also all that are submitted to the action of the *absorbing apparel.* Thus, it sometimes happens, that a temporary tooth situated near that which should be replaced, is found to be partially destroyed by the fungy-form body destined to destroy its neighbor; so that the two milk teeth drop out together to be replaced by only one, an irregularity in the adult teeth may result from this; for the other tooth is about to sprout out and finds its place occupied, it sometimes deviates to the interior or exterior side.

If the development of the apparel is imperfect, or if the appendage of the sack has been destroyed by an injudicious operation, the tooth frequently remains imbedded in the alveolus and does not sprout. I have now in my possession the jaws of an adult, in the substance of which the *dentes sapientiæ* still continue enclosed.

Immediate contact between the temporary and tooth of replacement cannot exist, when the last is still enclosed in the maxillary bone, but it very frequently occurs, while it is encaged in the exterior aperture of the *iter dentis*, when the tooth that should have been moulted, is found disordered, and, in such a case, the destruction of the temporary root is found imperfect, which would not be were the destruction the result of *usure* or absorption.

M. Duval, always so judicious an observer, has also made similar remarks.

I have seen many cases in which a last molar being found directed towards its neighbor, after their formation, has determined a sensible depression on the crown of this tooth, but its enamel was not at all altered, and its thickness was the same in all its other parts.

There, nevertheless, is a method of absorption that depends on a diseased affection, which is frequently met with in the practice of surgery, as when a bullet having remained several years in the thickness of the cellular tissue, presents numerous proofs that the capillaries are formed to alter their economy. I also know a person from whom two superior incisors were ex-

tracted on account of decay, and whose places were then filled by two others that had, an instant before, been taken from a young man; these teeth maintained their places for two or three years, after which the alveolar absorbents consumed these stronger guests; small imposthumes upon the gums followed, and the teeth fell out, their roots having been reduced to osseous fillets that presented a thousand asperities.

Fox has represented a similar case.

I have performed upon myself, and also upon several other persons, an analogous operation, which consists in extracting a diseased tooth, removing its soft central parts, filling it with gold, shortening its extremity, and then replacing it. After five years this tooth is now as solid as the others.* Still, I do not doubt that it will one day end in its being separated from the jaw, for it frequently occasions me very acute local pain, and aggravates the tic douloureux to which I am subject. This neuralgia always commences at the tooth, and then spreads itself over the whole side of the head; so that I frequently repent of having replaced it.

I have extracted teeth that had become very loose, in consequence of inflammation of the periosteum, whose alveolus had acquired a supernatural capacity from the sole action of the absorbing vessels since there had not been any caries. The periosteum was bud-like, very thick, and resembled the fungy-form body that destroys the roots of the primitive teeth. But absorption of this sort is the result of a local malady, determined by the presence of a noisome body in the midst of the parts that it irritates, and which endeavor to dislodge it. This they do, in consequence of the inflammation and pain which give each other mutual support. The first is the instrument with which life is provided to effect the expulsion, the second calls upon the patient to seek speedier relief.

*It does not enter into the plan of this work to give my sentiments respecting these sort of engrafted animals. I have tried various experiments with them, that I will repeat at another time, and from which I have concluded that the teeth placed in the alveoli, after having been extracted, acquire a sort of vegetable existence by means of a periosteum or false membrane that is developed, and holds them in their places.

Nature, in order to open a passage for the molars, which are situated immediately below the gums, and separated from them only by the lamina of bone penetrated by a large orifice, alike accords them the aid of absorption and the organ charged to perform it, is remarkable for its breadth and thickness. It wears away the gum as well as the maxillary bone, but especially opposite each tubercle of the tooth ; but this body does not possess the redness of those which consumes the primitive teeth.

If the absorbents are developed with energy anteriorly, the tooth of replacement, that was at first behind, is carried to the side, and the partition which separates it from the temporary, is soon destroyed. It is placed immediately below this last, and sometimes ends by pressing beyond it.

Whilst it executes this movement, the posterior lamina of the jaw is gradually brought to meet the anterior, which appears very much to aid the progression of the tooth towards the side. The approach of the two maxillary osseous lamina, is very appreciable, when we compare the jaws of children of different ages. As soon as a part of the crown of a tooth is engaged in the buccal aperture of the dental matrix, the glutinous liquid, that we have said is therein contained, gradually flows into the mouth. It is probable that when the internal membrane touches the tooth, the contact increases still more the contractile action of this envelope, for the small bone enclosed by it, is then in a few weeks, raised above the gums ; while it has required many years to gain their level.

Although the absorbing apparel be well developed, still if the *iter dentis* is situated too much within the mouth, not only does *the tooth destined to follow its direction*, shoot up without the circle, but also the temporary root, either cannot receive any taint, or, as I have before observed, the neighboring temporary will be destroyed, whilst the one that should have been, remains untouched.

No one, not even the slave of his own laws, can suppose that nature, never deviates from the mechanism I have here described ; the tooth, it is true, in the greater number of instances, follows the natural route ; but it is not rigorously subject to it. If the absorbing apparel is developed with too much energy on

the anterior part, every thing that is found placed before it is rapidly destroyed; thus the interalveolar partition, the root of the temporary tooth, the compact anterior lamina of the jaws, and even the gum that covers it, are alike consumed, so that the point of the tooth, instead of following the canal of the appendage, opens for itself an artificial passage by piercing either laterally or anteriorly the small matrix. It shows itself very low in the jaw, and below the level of the temporaries, if it is in the inferior jaw; or very high and above the same teeth, if it is in the superior. These aberrations may from time to time be observed in the bicuspidati, but more frequently still in the conoids. I, for a long time, believed that the deviation of the *iter dentis*, could alone occasion *gag teeth*: but anatomical examinations have convinced me that I was in error. Still *gag teeth* are gradually brought into the circle, unless some mechanical obstacle there opposes them, as for example, the presence of the temporary teeth, the striking of the inferior teeth, &c. &c. Finally, they are a long while in accomplishing this movement, and it is frequently necessary to determine it by the aid of art.

CHAPTER IV.

METHOD OF THE ACCRETION OF THE JAWS—DEFECT IN THE CONFORMATION OF THESE BONES—WANT OF DEVELOPMENT—DEFECTS IN THE CONFIGURATION OF THE DENTURE.

It being impossible, as I before remarked, that there should be any immediate pressure of the teeth, like that of wedges, between themselves, except during the period, in which they are encaged in the gummy aperture of the *iter dentis*, the crowns of the dentes permanentes finally appear either between the temporaries or between the teeth of replacement. It is at this moment alone that the mechanical increase of the jaw from the

contact of the teeth commences; for until now the liquid contained in each of the small dental matrices has been effecting it. The maxillary bones, therefore, besides the general mode of accretion, resulting from nutrition, have another peculiar to themselves, which coincides with the development of the sacks, containing a greater or less quantity of fluid, and with the manner in which the crowns of the permanent teeth are placed between those that may be in the line, whether these belong to first or form a part of second dentition. It is certain that the maxillary circle is much the more decided as these phenomena are performed with the greater ease.

Though the maxillary bones increase throughout their whole dimensions, they nevertheless do this in some of their parts in a manner more remarkable than in others.

In young subjects, the anterior portion is scattered over with pores, disposed obliquely and in such a way, that their enlargement tends to increase the arch. The medial part or body of the jaw, occupied by the two milk molars, not requiring any increase, is, in consequence, very compact, but we find a great number of these pores in the neighborhood of the maxillary angle and tuberosity, for these places very much need their aid.

Consequently the more fluid there is in each membrane, and the more numerous are the pores; the more the jaw will increase and the more room the teeth will possess; and they will obtain a smaller space, according as the contrary of this may happen.

From the imbricated disposition of the six anteriors whilst they are enclosed in the jaw, and also from the situation of the orifice of each *iter dentis*, we see that it is not astonishing that these small bones so frequently sprout out in an oblique direction and towards the inner part of the mouth; but they will, in this case, soon be brought within the circle formed by the others; because from the gradual annihilation of the temporaries, the intercallation of the teeth that push between those that are in place, and from the approach of the posterior lamella towards the anterior, the completion of the increase of the jaw necessarily results, unless some obstacle depending on a defect of the jaw, intervene. The knowledge of these various facts, at once shows, first, the influence of the dental matrices upon the expansion of the maxillary

bones, and in the second place, the importance of the immediate contact of the crowns of the teeth, as they gradually appear. It is more useful, therefore, to favor than to hinder the pressure that they exert on each other during the action of odontocie.

These details lead us to believe that we can facilitate the dentition of children, only by aiding the expansion of the alveolar circle; but those dentists who extract the milk teeth at very early periods, certainly neglect the indication, since this evulsion, so far from favoring the increase, is nothing less than depriving the jaw of one of those means that are provided for this purpose. I have before remarked, that the premature removal of one or more of the temporaries, so far from being useful, frequently determines a fault of configuration. For if we extract, for example, the six primitive anterior teeth in order to give room to the four incisors of second dentition, the last will jut out obliquely, be much separated from each other, and leave no resource to the conoids than to come out either above or below the lateral incisors. I am so frequently consulted about accidents of this sort, that I shall not signalise too much the disorders resulting from the censurable extraction of the temporary teeth. I can only hope that all dentists who are in the habit of this, will renounce it after having read this work. I know that when once a practice is formed, it is very difficult to recover oneself from its prejudices, and that we can always find arguments to set against the most positive facts: but I am confident that young practitioners will be very zealous to verify what I have said, and acknowledge with me the inconsistencies of the system that I oppose.

The germ of each molar of the lower jaw is found placed at the base of the coronoid apophysis, and the membrane that environs it is filled with a fluid, that, acting on the surrounding parts, forces the body of the maxillary bone to be carried in advance; whilst the angle that it forms with its branches sensibly recedes, which gradually brings it to 90 degrees, so that the more numerous and strong the teeth are, the greater the angle becomes. This may easily be verified by comparing the jaws of different persons at different ages, which Hunter, in his Natural History of the Human Teeth, has had engraved, and which

may also be seen in my Odontology. The same changes are necessarily observed in the posterior part of the superior maxillary bone. In the work of M. Serres, these last, especially, are very well studied.

The increase of the jaw being occasioned by the successive development of the teeth, we find, on examining a well formed maxillary bone, that it describes a semi-ellipsis, whose anterior portion contains the four incisors and the cuspidati; then starting from these, the ellipsis becomes more flattened and is carried obliquely behind, but in a line very slightly curved, while directing itself towards the temporo-maxillary articulation. It is to this method of accretion, and especially to the moulting of the milk molars, in order to give room to the bicuspides, which are smaller than they, that is to be attributed the changes in the relative situations of the mentorial foramena and the sub-orbitals, which the learned M. Duval was the first to observe.

The jaw is enlarged in the portion occupied by the six anterior teeth, by describing an arc which is the greater, as the teeth are larger and better arranged. As to the part that extends from the canine to the bottom of the mouth, the greatness of the transverse diameter of the face necessarily carries along with it the recession of the jaw.

I cannot conceive what has *induced several modern writers* to deny that this part of the ellipsi is susceptible of increase. It is only necessary to observe, in order to distinguish it. It is very manifest in children, whose second dentition is favorably presented. I have in a great number of cases sensibly perceived it, and we can give as convincing a proof of its existence as we can that of the *dentes movendi*, which happens from five to seven years. Those in whom it has not operated, are threatened with an irregularity of the second set. From this practical observation we perceive, that however great may be the zeal, the talent, and the skill of the surgeon, called to aid the arrangement of the dental arches, at the time of the removal of the teeth, he cannot always succeed in this enterprise: for he is sometimes thwarted either by natural disposition of the jaws of the child, by a want of development, by the unseasonable odontiasis of some of the teeth, by their too great size, or, finally, because a permanent removal of some of the teeth has been performed.

It is, therefore, very essential to know that the mal-configuration of the denture may be occasioned: 1st. By a defect in the conformation of the jaw. 2d. By the simple want of their development depending on the health of the individual. 3d. By an excess in the dimensions of all the teeth, though the jaws are in other respects well formed. 4th. By the rapid development of the dentition of one jaw, and the delay in that of the other. 5th. Finally, by the too great size of the teeth of one jaw, which do not harmonise with those that are opposite them.

The different configurations, both of the jaw and teeth, are susceptible of many varieties which experience alone can enable us to distinguish.

It appears to me, that it is from not having sufficiently studied these, that so many dentists have adopted a uniformity of practice that savors very much of routine.

I shall not here speak of a deviation of the teeth that proceeds from a congenital fault of the jaw; we see that this defect, called *hare-lip*, by which the palate circle is frequently divided, necessarily carries along with it an irregularity in the arrangement of the teeth; I will only observe, that in the operation which this defect necessitates, the surgeon should have in view, not only the re-establishing the continuity of the lip, but also the regulating, as much as he is able, the dental arch.

Only one of the jaws may be configured in a vicious manner, but sometimes both are mal-formed; the superior is defective in form: 1st. When the alveolar arches are compressed on the sides, and the anterior part is carried too much forward. This predisposition is frequently accompanied with a deformity of the bones of the nose, which are pinched together, so as to resemble the beak of the perroquet. The palate, instead of delineating a perfect arch, presents a sort of triangle, somewhat like the arcades of Gothic architecture. This conformation determines the approach of the anterior teeth that are crowded together at the time of their shooting up. I have frequently observed whole families, in which this appeared to be hereditary. 2d. The palate may be mal-formed in a contrary manner, and present an arch much flattened and very spacious, but then the arrangement of the teeth will not suffer; for instead of being

crowded, they will be separated from each other. I will here again remark, that almost all those that are afflicted with the rickets, have good palates, which proves that the rickets does not prevent the development of the bones of the jaw, nor of those that are found enclosed in them.

The defects of the inferior jaw are of the same kind; either it is compressed in its lateral parts, and then the anterior teeth are pressed together and placed some before the others; or the circle that it describes is too great, which causes the inferior teeth to come forward, raise the lip, and cross the superior incisors and conoids, by pressing before them whenever the mouth is closed, just like what may be observed in the denture of dogs.

In certain families, this predisposition is frequently hereditary. It is very common among particular nations, as the Scotch, the English, &c. &c. The mouth indicates it in earliest infancy; it is also the lot of some subjects in whom the general ossification is with difficulty effected, such as children of a very mucous temperament; second dentition, by determining a happy afflux of the osseous juices towards the jaws, sometimes diminishes it, but most frequently increases it.

Thus we see the defects of conformation are more or less decided, and are relative to a faulty development of either of the jaws, or sometimes even of both.

Defects in the configuration of the denture may resemble those in the conformation of the jaw, but the habit of carefully observing, will prevent the surgeon being deceived.

Thus the inferior teeth being too large, or shooting up much sooner than the superior, the rapid increase of the lower jaw allows its incisor to be carried forward.

During this time, the superior jaw has remained inactive, its incisors finally show themselves: but those that meet them from below at each occlusion of the jaws, continually push them towards the concave side of the dental arch: hence results, *either a retracted superior denture, or a projected inferior one*, which, it is very essential to distinguish from that vice of conformation which causes the chin to portrude, so as to *resemble a shoe*. We may remedy the two former, while it would be dangerous, or at least useless, to attempt to correct the latter.

I thought our attention should the more be fixed upon this subject, as most authors have not sufficiently dwelt upon it; M. Duval has spoken of it, and, though he is too brief on this point, yet he cannot be consulted without interest.

As to the rest, real defects of conformation are of very rare occurrence. The jaws may be very well formed, the palate present a finely rounded arch, the inferior jaw describe an arc of a perfect circle, and the teeth not jet out larger than in the ordinary state; and still they may be irregularly arranged. Here then, is simply a want of development—an organic defect.

In like manner, the jaws may be sufficiently developed, though the teeth are badly arranged; in this case, the superordinary or supernatural size of these small bones occasion the irregularity of the denture.* Thus every traction that may be practiced on these organs will be imperfect, unless we previously facilitate their arrangement by the use of the file, if their crowns are too large and their roots of no more than the ordinary size; or by sacrificing one of the teeth, without the range, if the crowns and roots are alike too great.

We shall return to these particular points, when treating of the natural method of arranging a set of teeth at the period of shedding the temporaries.

CHAPTER V.

DIVISION OF THE TEETH INTO TWO CLASSES—ONE CALLED THE TEMPORARY OR MILK; THE OTHER THE ADULT OR PERMANENT—PERIOD OF THE CHANGE OF TEETH CALLED MOULTING—ERROR OF THOSE WHO BELIEVE IN A THIRD DENTITION.

Should we be astonished that the ancients invented and repeated such absurd stories about dentition, when we reflect,

* I have frequently observed very large teeth in scrofulous infants..

that, even in these latter days, authors on physiology have not given themselves the trouble to notice those physiological differences, by which we distinguish the teeth appertaining to one denture from those belonging to the other? Prejudicial errors are, therefore, inevitable, if we neglect to study the proper characteristics, not only of each class of teeth, but also each individual in the series, of which that class is composed. A knowledge of the irregularities of *odontocie*, is not the less indispensable. The same may be said of the number of the teeth, for Bichat,* from having followed *Bertin*, has falsely asserted, that the first temporary molar is replaced by the two bicuspides. *M. Baume* is likewise deceived.

I will, therefore, attempt to fill up the blanks, which, in most of our elementary books, exist on this subject; thus, each jaw of the infant is provided, until about five and a half years, with ten teeth, which are called milk teeth; but which are better named temporary or deciduous teeth, since they are soon replaced by others. This change is designated by the word moulting or shedding.

The color of the primitive is generally inclined to a light blue. The volume of the six anterior is not ordinarily less than the space occupied by the same number of the smallest of the adult teeth. Their cutting edges are finer—their crowns rounder and better set. The four milk molars do not have the same forms as the four bicuspides, by which they are to be replaced; they rather resemble the adult molars; but their surfaces do not present the same. The first of them has three points on the side

* Bichat (Anat. Ginival, page 94—97) says, that there are twenty-four teeth belonging to first dentition, and consequently he comprises in this the first permanent molars, that appertain to the second, and do not shoot up till about five and a half years. In admitting three deciduous molars for each side, he not only commits an error, but also contradicts himself, for in one place he admits twelve temporary teeth for each jaw, while a little further on, he acknowledges that there are only eight which are to be replaced. Had he consulted the works of dentistry, he would have avoided this mistake.

I have, three or four times, seen a supernumerary tooth of first dentition, but this is a circumstance of rare occurrence. I have also seen several instances of children in which one or two temporary incisors were wanting.

next the tongue, and two on the side next the cheek. This tooth appears to be compressed from without to within. The second is rounder, and exposes five points, three on the outer and two on the inner side. The faces of these two teeth, which correspond to the cheek, are flattened and inclined in a remarkable manner; near the neck we perceive a sort of gibbosity.

These teeth in the inferior jaw have two roots, which are very strong and much separated from each other; in the superior jaw, they have three. The first of these molars, I mean the one nearest the conoid, being about a third less than that which followed it, has led some authors to admit a small and a great molar of first dentition; a just distinction, but one that has caused those who have not rightly understood it, to make many mistakes. These teeth, as well as the conoids, are liable not to be renewed at the usual time of moulting, and, in this case, they frequently endure for many years.

L'Ecluse pretends, that the milk teeth are insensible, and that if the child experiences any pain in them, it has its seat not in the ganglion, but in the periosteum, which, from some cause, has become inflamed. A modern author, in our day, is equally certain, that the temporary teeth, at a certain epoch, cease to be under the nervous influence, *by reason of the obstruction of the nervous fillets that are carried to them.* I have often endeavored to ascertain, if these suppositions had any foundation, but in all the researches that I have made on this subject, both alone and assisted by intelligent pupils, I havs always, until the period of moulting, traced the nerves which are carried to the temporary class of teeth.

Though anatomical observations had satisfied me of the fact, I still was anxious, that all the young men, who were pursuing my course, should likewise be convinced: in consequence, I made, at two different times, and in the presence of those who were found in my visit at Orphelins, the two following decisive experiments, that may easily be repeated.

1st. I forced a very fine needle into the two central canals of several temporary teeth, attacked by caries; and immediately the pain experienced by the child determined me to extract them.

2d. In divers others of six or seven years, with sharp forceps, I cut some of the incisors in such a way as to uncover the *ganglion:* I then either had the mouth washed with cold water, or irritated the nerve with a needle, or applied a small quantity of nitrate of silver, and, by any of which means, I occasioned much pain. Hence, the teeth are sensible—and hence they continue to receive the nerves until the period of moulting.

Still we occasionally meet with temporary teeth, whose nerves and vessels have been obstructed, and sometimes even absorbed by the membranes of the teeth of replacement, but this is nothing more than accident, and such teeth are of a remarkably bluish color.

The adult teeth, or teeth of the adult, constitute second dentition—the ten anteriors of this class, form an order of teeth, called teeth of replacement, because they, in effect, replace the entire class of temporaries.

The molars of the adult, constitute the class of the permanents; these shoot up only once, and do not require the moulting of any teeth, in order to be replaced in the dental arch, and if one of them is extracted, it is not usually replaced by another; I say usually, for, it sometimes happens, that a supernumerary germ, found between its roots, gives birth to another tooth, that will afterwards appear.

Each class is composed of several series, in which we rank the teeth of the same kind. They take their names either from their use or from their forms. Thus the four anterior teeth are called *incisors*, or cuneiform, because they are shaped somewhat like wedges. In the superior jaw, we divide them into *great* or *central*, and into *medial* or *lateral.*

In the inferior jaw, these teeth are called small, but through a remarkable singularity, the laterals are the largest, even in brutes. Those which are placed after the cuneiform, have received a multitude of names, the most common of which are the *angular*, because they are found in the neighborhood of the angle of the lips;—the eye, because they are placed under the angle of the eye;—the *canine*, because they are compared to the teeth of dogs;—the lacerators, because in carniverous animals they serve to tear in pieces their prey;—finally, we also call

them the *cuspidati* or *conoids*, denominations that appear to me to be the best. These teeth are more convex than the cuneiform or incisors. Then come the small or semi-molars, better denominated the bicuspides, from their being armed with two points; they, therefore, differ much from the milk molars, which they have replaced. Finally, we call those which follow, molars or grinders. These have, also, received the name of *quadricuspides*, on account of the four eminences that are observed on their crowns. In general, this series of teeth present quadrilateral surfaces, with rounded crowns; their labial faces and those which correspond to the cheeks, are also round.

The course pursued by nature in first *odontocie*, is not always the same that is followed by her in the second; thus, in one, the bicuspides spring up before the conoids or canine, while in the other, they do not appear until after these. First dentition, also, may terminate in good time, and the second be tardy, and so *vice versa*. They are, therefore, absolutely independent of each other. Hence, children that have had bad *temporary* teeth, may have very excellent adult ones. We may also observe that the primitive teeth are very rarely badly arranged, while those of replacement are very frequently ill adjusted. From the knowledge of the development of the teeth, by means of germs, we perceive, that it is not because a temporary tooth has been removed, that one of the adult teeth come up; but because the absorption and natural moulting of the first only happens, inasmuch as *the second* is developed; so that, were not this to occur, the *primitive* might remain in its place throughout the whole life, even as we sometimes observe is the fact with persons of a very advanced age. But as the leaves that cling to the tree, in autumn, are yellow and withered, so the temporary teeth left in their place, lose, after the third or fourth lusture, that whiteness which before constituted their charm; having been formed to be destroyed at a certain epoch, nature, after it has passed, appears to grant them, with reluctance, a very small quantity of the nutritious juices. We may now easily see, that, to the prolonged sojourn and tardy moulting of some of these teeth is to be attributed the foolishly accredited error of a third dentition.

The moulting of the teeth, being a law of our organization, the professional man, when called upon to direct the arrangement of the adult teeth, should possess an accurate knowledge of the physiological facts, of which I have just given an outline. He ought to know how to act opportunely; but he more frequently ought to remain a positive spectator, in order not to oppose nature by painful and useless operations.

There are certain periods of life destined for the operation of certain phenomena. Thus, respiration is established at birth; the temporary teeth sprout up during the first two years;—then they are shed in the course of the second or third lustures; menstruation frequently does not commence until dentition terminates, etc.

It is the first permanent molars that give the signal of *moulting;* they commonly shoot up at from five to six years, (rarely at a later period,) and are placed after the temporary teeth. It is thus that the all-provident Creator gives us new teeth before we are deprived of those of our childhood. But the moulting of some of the temporaries may happen very much before the shooting up of the teeth of replacement; this proceeds from the occasionally too precarious development of the absorbents that enter into the composition of the *dental matrix;* it is, however, only a peculiarity, for, in the majority of subjects, the moulting of a temporary, is closely followed by the *odontocie* of that which should replace it. And, though the shooting up of each series of teeth is susceptible of much variety, still we may distinguish those natural orders in the *odontocie* of replacement, and sometimes the period at which it commences.

First order: sometimes at the age of five years, but more commonly at from six to eight, or even nine, according to the strength of the child, two temporary incisors are moulted, at first on the lower jaw, to be replaced by two new teeth. The upper centrals drop out, and their places are soon occupied by two new ones. Then follow the inferior lateral incisors, and in turn these are followed by the laterals of the upper jaw, but they do not always alternate thus.

After the eruption of these teeth, there is a repose of a shorter or longer duration, which sometimes continues for two or three

years. Then towards the age of nine, ten, twelve, or even fourteen years, the first bicuspides of each jaw drive out the first or small milk molars; then the second bicuspides come up, which determines the moulting of the second temporary molars. Finally, the conoids, or adult canines seize upon the place of the primitive of the same name.

In this order there is a variety, which consists in this, that sometimes the second bicuspides shoot up after the conoids.

The second natural order only differs from the first, in that the conoids or canine spring up before the first, and even the second bicuspides. *The third order* consists in the simultaneous eruption of the conoids and bicuspides. The first order appears to me to be the most common. The second, next. As to the third, it is altogether less frequent.

The second great molars or quadricuspides, usually come up as soon as the conoids are in place; that is to say, about the age of twelve years. But it sometimes happens that they precede them. The eruption of the teeth, moreover, presents frequent irregularities; sometimes we meet with a subject from ten to twelve years, on one of the sides of whose jaw there has been no moulting, while on the other, all the twelve have been renewed. The medial line, in such case, separates first from second dentition, which are found together at the same time, in the same mouth. In some others, the teeth have sprung up in a portion of one of the jaws, while in another part, there is no indications of them. At the *hospice of Orphelins*, where a great number of children are submitted to my examination, I have seen the bicuspides come up at seven years, and the incisors not break until twelve, etc. etc.

I have generally observed, that both dentitions are more precocious in subjects that are affected with diseases, whose seat is in the head, while they are more tardy in those that have mucous or mesenteric affections.

The class of adult teeth, in a certain number of individuals, is composed of twenty-eight; nevertheless, four of these in the majority of cases, only come up at from the twentieth to the twenty-fourth year. But then eruption now and then occurs at a very advanced period of life, for we have had occasion to ob-

serve some persons who did not have them until about sixty years, and even at a much older age.

The development of the teeth has a remarkable influence upon the physiognomy, for it is only as this is gradually effected, that the maxillary bones become enlarged—that the angle of the inferior and the tuberosity of the superior jaws are carried more or less behind—and that the perpendicular diameter of the head acquires a greater height.

What a difference between the mouth of a child of five years and that of one of eight or nine; the former is rounded and graceful, the latter stretched and of a much greater size. In effect, the very rapid shooting up of six or eight anterior teeth, produces an almost sudden change in physiognomy. The development of the alveolar edges is effected with so much promptitude, that there no longer appears to be any harmony between the maxillary bones, and those of the rest of the face.

Thus, at the period of second dentition, the sweet expression of the infant is lost to give place to that of the adult—and the facial angle, instead of being open, becomes more contracted.

We may remark as a striking change, when a person, after having had all his teeth, finds himself suddenly deprived of them; for the breaches that result, are not only troublesome in the articulation, but also determine a deformation in the traits of the visage. The volume of the teeth belonging to second dentition, is variable, and, in the human species, is not proportional to the strength of the individual. Thus, we sometimes see very robust people with very small teeth, while in others who are of a weaker constitution, these are of an enormous size. The examination of the teeth, with reference to this relation, might give rise to many very interesting physiological considerations, but would lead me too far away from the consideration of the present subject.

We sometimes meet with persons, whose palatal arch and inferior jaw are very fully developed, while their teeth are very narrow, and have a very observable space between them; this constitutes a slight irregularity that we should not attempt to remedy.

Although the mouth of man is generally furnished with twen-

ty-eight or thirty teeth, still it occasionly happens that some of the germs of the adult teeth are, either not at all, or very tardily developed. In the latter case, the absorbing apparel destroys the temporary tooth above or below it, which has not before been moulted. The conoids, the bicuspides, and the small cuneiforms are those, as I before observed, which most frequently afford these varieties, I have had occasion to see several aged persons, in whom the teeth sprung up at very late periods, especially a lady at seventy, each of whose jaws was endowed with four excellent teeth, after the loss of all the others. These were the *conoids* which had not come up in her youth, and the *dentes sapientiæ*, that for a great number of years, had remained enclosed in the jaws. Persons little skilled in the art would have taken this for an instance of *third dentition.*

Had ancient anatomists entertained true notions about the formation of the teeth, and the varieties of nature in the variable epoch of their eruption, they would not have copied from each other the absurd fables of Euriphius, Emyptolemus, Pyrrhus, each of whom, it is said, had only one tooth occupying the whole of the jaw.*

What shall we say to those, who assure us that each of the daughters of Mithridate had two ranges of teeth, and that this was also the case with Thimachus? What to those, who tell us, that three rows adorned the jaws of *Hercules*, as well as those of the children of Columb?

We answer, we would still see those phenomena reproduced, were not dentists careful to extract in time those temporaries whose roots are not wholly, or the same as wholly destroyed, after the eruption of the teeth of replacement. Were they not to do this, they would come up sometimes within, sometimes with-

* May it not be possible that the text of the ancients has been corrupted by translators? Thus Festus calls *Prussias*, Monodows, from his having only one tooth in the superior jaw; but he does not say that this tooth occupied the whole of the jaw. We also see too many persons in our day to whom no more remain. As to the rest, the tartar, that from want of care, collects on the teeth, sometimes unites them in such a way that a careless observer might easily be led to suppose, that they formed only one and the same body.

out the arch, which would present an extraordinary number of solid teeth. Lastly, I, with several of my pupils, observed this aberration in a girl of twelve years, from whom I took four temporary incisors, whose roots were still untouched, though the teeth of replacement had made their appearance on the inner side of the circle, and not far off from those that I had extracted. As to the rest, this double or treple range can exist only in the anterior part of the mouth, because it is only here that the teeth are renewed. Ought we not, therefore, to be surprised, when we see a modern author of the eighteenth century, seriously reproducing these same stories of a *third dentition*, at the age of eighty or a hundred years, which are reported by *Mutianus*, Aristotle, Mentzelius, etc.?

We cannot but smile at the simplicity of an ancient author, who says, he saw in a child's mouth a tooth of gold; a juggling trick, of which, there is no need that the physician should be the dupe.

Finally, many persons have reported pretended instances of children or adults, from whom a tooth has been removed, after having been before removed, which was nevertheless a second, and even a third time replaced.

All these errors have had their source, 1st. In the ignorance of the people. 2nd. In the want of skill in physicians, who, even in our day, have paid very little attention to dentition; but it is now time that the falsity of these assertions should be understood, in order that we may not imitate the propagators of these absurd follies, whose credulity has given too many pretexts to the ignorant for extracting crowded teeth, while, at the same time, they have induced their victims to expect that these would be replaced by other and prettier ones; but to the great chagrin of the credulous and the confusion of the operators, these last are still to come, and, in waiting for them, recourse must be had to false ones.

Still nature at one time appears to be avaricious, and at another profuse. There are some individuals who have supernumerary teeth. I saw at the hospice, an infant whose first dentition presented six incisors of the inferior jaw; after moulting, these were replaced by four only. In many dissections I have observed several examples of such irregularities.

Thus I have met with persons, who had five adult incisors,* *three canine*, or five bicuspides, instead of the ordinary number.

Finally, practice shows us interculary teeth, which are small abortions placed between the central incisors or others, but they rarely possess the form of the series of teeth in the midst of which they are found. On the 22d of July, 1818, M. Debay, a young surgeon dentist, brought to me a child of nine years, showing a medial incisor between the two superior centrals.

Sometimes there are twin teeth, or teeth with double crowns. I once dissected a very young subject, in which I found a milk incisor, presenting this peculiarity.

The roots of some teeth, are sometimes so closely entangled that we have seen two extracted, when it was intended to effect the evulsion of only one. Fox has had engraved quite a number of these sorts of small phenomena.

Finally, we may observe another singularity. We have had at the hospice of orphans, a child of eight years old and of an evidently scorbutic temperament, that never, *would any one believe*, had any temporary teeth. This child was carried to the country and died; I was not, therefore, able to ascertain if the germs of the teeth of replacement existed. Fauchard cites an analogous case. Beaumes, in his excellent treatise on dentition, relates that a beadle of his acquaintance, named Vaizor, (commune de St. Gilles,) never was possessed of a single tooth; Villa, likewise reports, that in his own time, Phereceats never had any teeth.†

These things, however rare, have nothing in them that shocks common sense, but as to fables, let us have poets to please and

*I have just extracted one of these duplicate teeth, from a nephew of one of the first *valets de chambre de S. A. R. Monsieur.*

†I dare say I shall be accused of obstinate incredulity, but I confess, that I scarcely believe in a *congenital and absolute want of* all the germs of *the temporary and adult* teeth, since I have seen in different hospitals to which I have been attached, many young children, that were sick of a cancerous or scorbutic inflammation of the gums, which carried along with it the mortification of a greater or less number of the germs; whence I conclude, that, those in whom we observe a total absence of teeth, may have been deprived of them by similar causes.

amuse the idle, among the number of whom the physician should never be found.

The mass of certified facts that I have brought forward, should serve the physician as a basis to establish a certain method of directing the arrangement of the adult teeth. Nature in effect directs all her care to the enlargement of the alveolar circle; and in order to effect this end, she combines various means. Let us succinctly recapitulate them. 1st. The general increase of the maxillary bones, depending on that of the other bones of the body. 2d. The periosteum of the maxillary bones, very remarkable in the places where these should be especially increased; namely, anteriorly from the medial lines to the first temporary molar, posteriorly from the second molar to the coronoid apophysis. 3d. Six small imbricated matrices, each of which contains a tooth steeped in liquid, that acts somewhat like a wedge, to dilate all the surrounding parts. 4th. *Progressive disimbrication* of these small matrices, as the circle is gradually enlarged. 5th. The development of an apparel charged to absorb every thing that might oppose *odontocie*. 6th. The eruption of the teeth according to the natural order that I have described, subject however to some varieties.

We shall, in the following article, see what advantages may be derived from the knowledge of these various phenomena.

CHAPTER VI.

NATURAL METHOD OF DIRECTING THE ARRANGEMENT OF THE ADULT TEETH.

Since the progressive eruption of each series of teeth is one of the laws ordained by the Creator, why have so many authors on dentistry endeavored, by the spirit of their systems, to follow

a different course? why do we find so many *dentes excerti* among children of the *wealthy class*, whose dentition meets with the more attention, while they are of so rare occurrence among the indigent that have very little recourse to professional aid, but rely upon the goodness of nature.* Is not a part of those vicious dentitions, which we so frequently meet with in society, owing to the unsound system adopted by dentists? Is not their system founded rather on faulty reasoning than on the study of the anatomy and physiology of the mouth and jaws? These are questions which I shall endeavor to resolve, while giving a general view of the system adopted and recommended by men whose works are in very great repute.

Among these, Fox has been very positively explicit on this one subject, and his opinion has been received by many practitioners. I will, therefore, here give what he says of it.

"Irregularity of the permanent teeth is most commonly occasioned by the resistance made by the nearest temporary teeth; this is always the case if the temporary teeth are small and close set, for as the permanent *incisors* are much larger than the temporary, they require more room; but as the space left by the shedding of the temporary teeth is too small for the regular position of the permanent, they are exposed to the pressure of the next tooth, and hence are frequently turned out of their right direction."

He continues: "It will be proper in this place to observe the manner in which the jaw bones grow, (the under one taken as the example,) and to point out the difference between the temporary and permanent teeth."

"After a child has obtained all the *temporary teeth*, the *jaw* in *general grows very little in the part* which they occupy.† In

* We see children continually coming into the *Hospice dis Orphelins*, but in this vast number, very few are found with their teeth badly arranged; yet the majority of them are delicate, and with their organs much debilitated from long privation of sufficient nutriment; which must, by preventing the general development, dispose to irregularities in their denture.

† It is very easy to assure ourselves of the falsity of this assertion: take a pair of dividers, and having measured the distance of one conoid from another on an adult, compare it with that on several children of five years,

those children who are an exception to this rule, the temporary teeth become a good deal separated from each other, and these are the cases in which the shedding of the teeth is effected, without any assistance of art."

Fox, therefore, and all those who think with him, consider the temporary teeth as preventing the regular arrangement of those of replacement, and, instead of having perceived that the enlargement of the anterior part of the maxillary bone is natural, they regard it as a fact of rare occurrence: consequently their practice is as follows:

From a child of from six to seven years, in whom one or two central *incisors* appear, they extract not only the milk centrals that are to be replaced, but also the laterals; because the permanent teeth that are presented, are a third larger than those that are to be replaced; and they suppose that the evulsion of four milk teeth, is the only means to obtain a sufficient space for the adult.*

Four temporary incisors having been removed to give place to *two adult*, they are forced, whenever the lateral incisors are announced, to extract the milk conoid or canine.

Now let us recollect that, in the majority of cases, the bicuspides shoot up before the conoid. The moulting of the temporary molars is effected, and the bicuspides arrive.

The dentist who has pursued this practice, here terminates the extraction of the temporaries; five on each side of the medial line of each jaw have been removed, with the intention of making room for four [or sixteen] of *second* dentition; these, then, occupy with much ease all the part of the circle which has been pre-

whose dental circle appears to be well developed, you will find that the same tangent taken on the *adult* is greater, by the thickness of a tooth. In effect, by what fatality, should the maxillary bones that have so much need of being aided in the arrangement of the teeth, be deprived of the faculty of developing themselves, throughout the whole extent, even as do all the other bones.

* See the Memoirs of the Medical Society of Emulation, the work of Fox, and the writings of other modern authors. See also the physiology of the teeth, in which the author combats the error that I have here noticed anew, though I had before spoken of it in my Odontology.

pared for them, so that the bicuspides and incisors are found almost in contact.

About the age of from twelve to thirteen years, however, nature gratifies the child with conoid or canine teeth, whose places have been usurped by those that precede them. When then shall they have their place? It is easy to divine, that this will be either within or without the dental circle; hence they will constitute what we call *dentes excerti*, which the majority of dentists find more expedient to remove than to bring into the row, or they extract the first bicuspides to make room for the new comers.

Many a young person whose dentition has been thus conducted, after having endured the evulsion of twenty still solid temporary teeth—an evulsion made with the view of arranging those of second growth—has finally been deprived of four conoids that are the strongest of all teeth, and which perhaps would have been preserved throughout the whole of life, even as we had occasion to observe on a great many old men, to whom these still remained. Those, therefore, who thus conduct dentition, fall into the very difficulty which they most wished to have avoided; for their intention was to *prevent dentes excerti*, and these are the very results of their operations.

The learned professor, *Desgenettes*, has said, of persons always ready to give medicines, "*That physicians, in our day, are more needed to prohibit than to proscribe.*"

The same may be said of those *dentists and parents*, who are ever disposed to sacrifice the temporary teeth under the slightest pretext.

The deformities that result are not attributed to this practice; but are accounted for, by the supposed smallness of the jaws; so that practitioners otherwise distinguished, every day commit the same faults on the good faith of the world.

However this may be, nature that always tends to re-establish an order accidentally disturbed, sometimes regulates the teeth of children, in spite of the *bad management* of dentists; for *dentes excerti* do not always result, even when the practice of the premature evulsion of the primitives is pursued, if general nutrition effects the increase of the jaw, and especially if the

adult teeth are of a middle size, or if the *conoids* appear before the bicuspides, because then the eruption of each of these teeth follows in the order of their position. But how are we to divine this, and base a method on expectation that may be disappointed?

It is, therefore, indispensable to examine dentition under its different aspects, in order to aid nature only when she of herself is unable to accomplish her task. It is then only that the physician is neither the slave of *systems*, *prejudices*, or routines; nor opposed to the operations of changes that he cannot foresee; the end at which the surgeon aims, is the proper adjustment of the *adult teeth:* but can he effect this only by the evulsion of the temporaries?

Does the presence of these teeth form the only obstacle? Has he sufficiently studied the varieties of the maxillary arcs, whose extension and development, being susceptible of accidental variation, present the real difficulty to be surmounted?

Have authors on dental surgery taken cognizance of the constant and natural imbrication of the teeth during their formation? Have they ascertained, that as the teeth of replacement are below the gums, there cannot be any contact between them and the temporaries, and have they from this understood, that these last cannot prevent the eruption of the other, except at the moment in which this contact becomes possible? Have they observed the ingenious means employed by nature to destroy the teeth, whose presence ceases to be useful? It appears to me that none of them have examined these various questions; for they then would soon have seen, that their system is essentially vicious; they would have perceived that the more the temporary teeth are removed, the more the jaws contract, instead of their being, by this means, necessarily assisted, and as it were forced to increase. A minute examination of the variable phenomena, that are first manifested at the time of the moulting of the temporaries, first led me to make these reflections; but it is only after having collected a great number of facts from the various public establishments, (containing a great number of children, of both sexes, and all classes and temperaments,) with which I have for more than twelve years been connected, that I

dared to attack the *systems* adopted by authors, who, however wise in many respects they may be, have certainly erred in recommending the necessity of repeated operations of a painful, useless, and frequently *dangerous character*.

The *natural method*, that I am about to explain, differs essentially from this; for, according to it, the presence of the temporary teeth are considered necessary, until a determined epoch,* and here all the care of the surgeon only tends to favor the increase of the maxillary circle; it never shows, that, whatever be the width of the replacing teeth, and even if their number be greater than usually it is, they will always have a tendency to be well arranged, provided the maxillary arc is proportionally expanded, whether by natural or artificial means.

But it is very essential to know that there are in certain individuals, predispositions that will prevent or retard the development of the maxillary bones; and which will, whatever be the system we follow and how small soever be the teeth, deprive us of the satisfaction of seeing them well arranged. Consequently the physician should ascertain, by inspecting the subject, if second dentition can be performed with ease, which he may presume may be the case, whenever he meets with facts below enumerated.

First. When a child of about seven years, on whom the temporary teeth are loosened, is of a good constitution—has not had any severe disease in the first three or four months of its life—and all its members are well developed.

Second. When the jaws assume a form rather circular than elliptical—the primitive teeth present a good arrangement—the palate does not describe a triangular arc, but offers a flattened and regular concavity; the inferior jaw does not project beyond the superior.

Third. When the temporary teeth are rather large than small, and are rather separated from each other than crowded together.

Fourth. When the teeth, primitively crowded, are after a time separated; which in effect may be observed from the age of four

* This opinion is also like that of Gariot, Treatise on the Diseases of the Mouth, page 214.

to five years, and is a certain indication that the jaw assumes its increase.

Fifth. When this separation is effected with harmony and simultaneously on both jaws; for, if it only occurs on one, and especially if on the inferior jaw, we should expect that the opposive denture would be prominent.

Sixth. When, between five and six years, we see four permanent molars appearing, in whose dimensions there is nothing extraordinary, for, in the contrary case, we should presume, that all those that are to come after them, will share this excess of size.

Seventh. When between the ages of seven and eight years, the temporary incisors gradually loosen, and on putting the finger within the mouth no jutting points are perceived, because then it is presumable that the teeth of replacement are forced below the temporary roots, and will determine their complete absorption.

Eighth. When the teeth are ready to be moulted, are found pushed before or raised by those that are to replace them, and which immediately show themselves from below.

Ninth. When all the temporary have been maintained, each in its place, and no disease has occasioned its premature evulsion or loss.

Tenth. When the natural loosening and moulting of the temporary teeth take place in the order and at the usual epoch for shedding each series of teeth in the human species; an order and epoch which we have before noticed.

The physician should be careful to ascertain whether the jaws of the infant have any hereditary tendency to assume particular forms; for we sometimes, as I before said, meet with a family, all of whose dentures describe exactly the same arc; which contributes not a little to establish a resemblance in their physiognomies. It is also proper that he should know how to distinguish the three ordinary positions of the inferior maxillary bones relative to those of the superior.

Thus, 1st. When the chin is short and the superior jaw well arched, the series of the six superior teeth passes before the six inferior, somewhat like the blades of scissors.

2d. When the chin is a little longer, and the teeth are short, the two dentures fall plumb upon each other without crossing.

3d. If the chin is very long and the superior maxillary but little depressed in its anterior arc, the six inferior teeth pass before the superior, like what may be observed on dogs and some kinds of apes.

Finally, there is a species of torsion of one or both of the jaws, which causes the superior anterior temporaries, on one side of the medium line, to fall outside of the inferiors, according to the right disposition, whilst the similar teeth on the other side of the same line drop within the inferiors; if in such a case the difficulty is not obviated, it is probable that there will be a similar disposition in second dentition.

After having completed this preliminary examination, the physician should make his prognosis, and inform the parents of what peculiarity the denture of their child will present, in order that the irregularities that may result, and which he cannot prevent, may not be imputed to him.

Though in certain embarrassing circumstances where there was a vice of conformation, I thought it advisable to make some modifications in the method that I am now describing, still I believe that it should seldom be varied.

Let us suppose that a *central incisor of second dentition* has much shaken the *temporary central under which it has arrived*, then I remove this tooth alone, even though its neighbor is found to be much loosened by the absorbing apparel of the adult central. I extract the temporary lateral, whenever the adult lateral, having arrived at the alveolar edge requires in turn, the place that it occupies.

These two new teeth are always more or less obliquely situated, and frequently carried more or less within the mouth; but we have seen that this disposition is natural to subjects on whom the absorption of the temporary has not been proportionate to the development of the replacing teeth, and experience informs us that they will usually rectify themselves as the child gradually increases in size.

The subject having attained the age of about ten years, the first bicuspid on each side of the jaw appears; consequently, if

the small milk molar does not fall out of itself, I extract it; to which the child submits with little repugnance, as it is usually found loosened, soon after the second bicuspides replace the second primitive molars; finally, these teeth being in their place, the milk conoids which I am very careful not to sacrifice under *any pretext*, are extracted only when those that replace them are announced. These last, whose places have been preserved with so much care, are intercalated, like wedges, between the incisors and bicuspides, and come with the more facility, in a line with the others, because they are narrower than those they have driven out, and can, therefore, while growing, yield a little space to the conoids.

If it happens that the *canine* precede the *bicuspides*, I, in consequence, am led to extract them, whose looseness turn me from what I, otherwise, would have done.

According to the method I have just described, it is only necessary that the surgeon dentist, should, for the most part, be a tranquil observer of the shedding of the teeth; for the temporaries frequently fall out of themselves, and when he thinks that he ought to aid nature, we see that he should extract only one tooth at a time, whose place may be supplied by another: so that in following this course, he will not notch the denture of a subject, when any of the adult teeth have failed, as they frequently do,* to be developed.

Thus, this method is founded on the principle that each of all the temporaries, before they are replaced by an equal number of adult teeth, does not form any true obstacle, except at the moment in which that which is to succeed it begins to appear, and, instead of the neighboring teeth being considered as opposing the arrangement of the one that arrives and endeavors to intercalate itself between the others, they should be regarded as affording solid parieties against which this tooth may be supported, forcing thus the jaw to be increased; but if this effort does not follow, I think it right to employ mechanical force to

* I have seen persons on whom the lateral incisors have never come up, in such cases the canine sometimes border on the great incisors, at other times the temporary lateral incisors remain.

produce it, especially if the child has been in good season deprived of some of the temporary teeth, or even if we perceive that those of replacement, being too much pressed by their neighbors, whose time of moulting has not yet come, threaten to preserve that vicious obliquity which they affect. Thus, in a very great number of cases, I have obtained this enlargement, with the aid of a thread, which having been twisted around the temporary and adult teeth, becoming swelled by the humidity of the mouth, soon brings to its proper place the tooth that appears to be about to take a wrong direction. This is a simple process, and when the dentist has once or twice placed the ligature in the presence of an intelligent person, he may entrust to him the task of its removal. At other times, small wedges of wood have been employed with like success. In general the traction should be gradual, so as to give the maxillary bones time to yield to its impulse.

We must not lose sight of this physiological principle, that, by drawing a tooth away from one side, the alveolus is enlarged, and a slight swelling developed, that occasions a supportable disquietude, which degenerates into pain, if the sensibility of the parts has not been treated with skill; it is, therefore, necessary to allow nutrition sufficient time to effect the absorption of the alveolus on the side to which the tooth is to be carried; whilst the opposite wall will approach it, and the osseous juices supplied from exhalation, by filling up the vacuum, render a deviation impossible.

The deviations of teeth of the ordinary size are very common to feeble children, on whom the absorption of the temporary roots is generally effected with difficulty, and the increase of whose maxillary circle is very backward.

Deviations caused by the excessive size of the teeth, unaccompanied by a vice in the conformation of the jaws, are likewise of frequent occurrence and require different operations, according to the different cases.

When each tooth is only a little too large, we should, before employing the traction by threads, file between the several teeth; we may by this means, obtain from the whole, the space of a third, or a fourth of a tooth, which ordinarily is sufficient; but

we should sooner sacrifice a tooth than cut the rest too much, when the size of these bones appears to be extraordinary, and especially if there exists the least defect in the conformation of the jaws. When the fault is very decided, I find it more prudent to remove the teeth out of the row than to attempt to bring them within the circle. As to the rest, we should never be in haste to make their evulsions, for the jaw sometimes increases when we least expect it; so that instead of there having been a sacrifice of several teeth, which it was supposed must one day be removed, that of one alone has frequently been sufficient; while we are thus temporising, therefore, we are only courting favorable opportunity. I never have had occasion to regret acting in this way, even when I have refused the reiterated requests of the persons that were charged with the children found in this condition.

It is, consequently, only after having been perfectly satisfied, that the teeth which are badly arranged can never be rectified, that I attempt to remove them, and I usually practice this operation about the age of twelve or thirteen years; for then the anterior arc of the jaw is susceptible of but little increase.

In other circumstances, when one is constrained to regulate the denture by removing the teeth, he should then extract some in preference to others; thus all dentists agree to sacrifice a small lateral or central incisor that is wholly out of the row; the same may be said of the conoids when in a similar situation, unless the bicuspides be diseased; but we should generally prefer to remove even one of these, in order to make room for a canine or conoid, that we believe can be brought back with facility.*

When I, from the arrangement, am led to believe that a small gap must result from the indispensable sacrifice of a tooth, I prefer to remove the second bicuspid, to facilitate the placing of the conoid; but then it is necessary to bring back the first bicuspid, by means of a thread that draws it towards the great molar. In this way a void space will be found in the anterior of the mouth.

The evulsion of a first great molar effected with caries, appears to me to be but little capable of favoring the arrangement

* See the Young Dentist, by M. Duval.

of a conoid, though it may be useful in assisting that of a tardy *bicuspid*. All these cases demand care, and may compromise the reputation that has not decided with sound judgment.

There, are nevertheless, two exceptions to this sort of general rule, relative to the following cases.

1st. When the jaws of a child, which are still adorned with first dentition, present the defect which causes them somewhat to resemble a shoe.

2d. When the vicious contraction of the upper jaw is such, that there is no hope that it can be corrected.

When my practice is as follows: I remove as soon as they appear, one or two small inferior central incisors of replacement, this operation in some degree arrests the development of the lower jaw, which it was found would be left to project beyond the superior; and as the other teeth gradually shoot up, I draw them towards the medium line and there detain them by means of a thread. Though fully convinced of the delicacy of this operation, and the responsibility hanging on my reputation, I have performed it twice and with complete success.

It will be seen, that in the two cases above cited, I readily sacrificed teeth that had just come up, without waiting until dentition was terminated, for then the vicious development of the jaw would have been completed, which, on the contrary, it is very essential to prevent.

It has been my good fortune, several times to bring back without sacrificing a single tooth, two conoids that had shot entirely without the circular line, in consequence of the bad management that had been used at the time of the removal of the denture, and which suspended the development of the alveolar circle; but before I commenced these important operations, I was always well assured that there was no defect in the conformation of the jaws, that the teeth were only of the ordinary breadth, and, finally, that the subject was not more than eighteen years old. Thus, whatever may be the cause of the deviation of the teeth, it is always accompanied by a relative contraction of the alveolar circle; but is it by removing the milk teeth that this will be ever enlarged? And it is well established, that we may determine the increase of the jaw, by attracting to it a

greater quantity of nutrition; should we hesitate to have recourse to this means?

Let us, therefore, know how to derive advantage from our physiological knowledge, in giving an agreeable contour to the face; but let us not, at the same time, forget that the vices of conformation, to which art has not in time applied its resources, should frequently be respected, and that the efforts which we make to correct them may, by disappointing our expectations, be prejudicial to the subject.

Would that the ideas of the beautiful and marvellous did not so much mislead us! says the judicious Duval, on this subject.

Still, if the defect in the conformation of the jaw be scarcely sensible; if, moreover, the teeth be rather small than large, and rather separated than crowded, we may then, with good hope of success, act as in cases of simple deviations, caused by a want of development; this is what is more frequently met with in the superior than the inferior jaw.

From the observations, (whence it is clearly shown that the problem to be solved is the increasing of the jaw, when this is not effected by nature herself,) we must admit that the sacrifice of the temporary teeth is, at least, useless; and that we should have recourse to the last resort of extracting the adult teeth only when there is no longer any hope of the increase, destroying or diminishing the defects; and mechanical means, skilfully employed, have been of no effect.

The irregularity of the teeth presents other facts equally as wonderful; thus, we sometimes meet with a tooth, whose lateral face is turned to the lips; we may also now and then observe one, whose inclined part or lingual face is entirely turned to the side opposite to that where it should be; there are some too, which shoot up very high in the gum, or very low in the palate.*

How very responsible is that precipitation, which drives some dentists to extract those teeth that have sprung up contrary to nature, since, in preventing one deformity, they frequently occasion another.

* Fauchard, Bourdet, Jourdain, Fox, etc. etc.

I have seen several subjects, from whom teeth that had come up in this manner were extracted, and who, in consequence, were forever after without the right number of teeth. We should thus act, only when the tooth is evidently one of those supernumeraries called *intercally* teeth.

Still, I do not advise to leave them in the situation in which they present themselves; the art is not destitute of proper means to correct these defects.

When one of the six anteriors has been completely turned round, we may make it perform a rotary movement on its axis, by applying on its crown a sort of die, moulded in the exact form of the tooth, previously isolated from the rest by the aid of a file.

We cannot without interest see this small machine, which I have always employed with success, whenever a case of this nature has been presented in my practice.

There are also transpositions of the germs, which cause us now and then to observe a small incisor in the place of a great one, or a canine in the place of a small incisor. Fox has had several of these aberrations engraved; M. Miel recently presented two such instances to the Medical Society of Emulation.*

I have several times seen two teeth placed one before the other, though they both belonged to the same dentition; in a similar case, I found two small incisors, neither of which was within the circle, and one of them was a supernumerary. I was, therefore, very much embarrassed in deciding which of them ought to be sacrificed, for the true supernumerary generally has a shorter root than the other, whilst, on the contrary, its crown is frequently very good.

I have still observed another variety, which consists in this, that the temporary conoids remain in the row, though the *cuspidati and bicuspides* of replacement have come up, and are well arranged in their proper order, [between the first permanent molars and temporary cuspidati,] so that the young person, whose mouth presents this peculiarity, has four very sound cuspidati, [in one jaw,] and this without there being any defect in the

* See Number 8 of the Memoirs of this Society, Aug. 1817.

dental arch. You may readily believe that, in such a case, I advised that not a single tooth should be extracted.

I will not here attempt to describe all the various machines that have been invented to correct the different deviations of the teeth, but only those that are in use at present, and recommended by men of merit.

Fauchard, Bourdet, and also Laforgue, only inform us that deviated teeth may be rectified by the application of osseous or metallic plates, pierced in holes, through which threads of silk are passed.

Thus it has been, for a long time, customary to set in order deviated teeth by means of luxation; the ancients used, for this purpose, the straightened forceps; the moderns have for it the bent one, which is a kind of powerful lever; but this operation demands prudence and handiness on the part of the surgeon, as well as courage on the part of the patient.

We find in the work of Fox, the sketch of a plate, in which there are small holes pierced in places opposite to the points of separation of the teeth, in order that threads of silk may be passed through them.

Two anvils are fixed at the extremities of this plate, about a line in thickness, and of the breadth of the molar teeth between which they are to be placed.

The plate, when properly adjusted, covers the anterior or labial faces of the teeth, which are, one after another, attached to it.

M. Duval speaks of a guttered plate, that has been in use for twenty years; but he has not given us any description or design of it. It is, probably, a sort of small inclined die, which, placed over the tooth that has deviated to the exterior, is disposed of in such a way, as to strike, at every occlusion of the mouth, the tooth that meets it. I have seen this small machine employed by a dentist, but it labors under the inconvenience of loosening the corresponding tooth as much as the one that has deviated.

M. Catalan has invented an instrument based upon the same principles, with which we may rectify several inferior anterior teeth, that have deviated to the exterior. This instrument, ingenious as it is, can only, I think, be applied with advantage when the superior teeth have deviated so much to the exterior

as the inferior to the interior, and especially if there be no innate defect in the conformation of the jaws. I never now use the various means of which I have just spoken. When plates are used without anvils they are forced into the gums, and thus give the child much pain; particles of aliment, too, collect between them and the teeth, which soon become very offensive;—they are also very disagreeable to the view. I, in consequence, employ a very simple means, which consists, 1st. In the application of a small metallic grate, fashioned in the form of the two inferior molars of one side; which, by preventing the closing of the mouth, suspends the contact of the teeth. 2d. With a fillet of silk or thread, I bind the teeth in such a way, that in a very short time, I succeed in leading the deviated tooth or teeth within the circle, of which they should form a part.

I so arrange the thread, that its action may be exclusively on the parts where its presence is necessary, and if the tooth has deviated to the exterior, I make the knot of the thread upon it, which tends to bring it still more to the interior. Finally, I use expedients to prevent the ligature slipping over the gums, and I renew it every two or three days. I have very frequently had occasion to make use of this process, and it always has succeeded, even when several of the means of which I have before spoken, had been employed in vain.

May we, without inconvenience, file the anterior teeth, when they are very much crowded, in order to give them more room? This is a question that is often put to practitioners by a great number of people.

It may be considered in two points of view, the *agreeable and the useful.*

As to the *agreeable*, since each one forms an idea of the beautiful, according to his particular taste, it would be impossible to shape the teeth in such a way as that their forms should please every one; for some like them to be short, others long, one prefers them close, another separated, etc. We must also admit that the kind of teeth that would suit the physiognomy of one person would not that of another. Finally, besides these particular tastes of individuals, there are others, peculiar to certain nations. Thus, in the Indies, black teeth are preferred, and to

produce this they are stained with various preparations. Some people cut their teeth in sharp points; others extract one of them, in order to pronounce their language according to their fancy, &c.

How great soever may be the tastes of Europeans for novelty, still the dentist, who should endeavor to introduce these various modes, would eventually fail in his attempt.

In France and in the neighboring countries, it is pretty well understood in what the beauty of the *denture* consists. Whiteness and uniformity are the two qualities that have excited the muse, both of the ancient and modern poets.*

Were I allowed to express my opinion, without contradicting others, on what consists the charm of a denture, I should say that when the six anterior teeth of each jaw are separated from each other by a space sufficient for the introduction of a quill tooth-pick, they not only appear more graceful than when wedged together, but also hold their own with greater facility.

As regards utility, to which the physician should more especially direct his attention, opinions are alike divided.

Some maintain that teeth naturally separated are less susceptible of decay, because particles cannot remain sufficiently long in their interstices to putrefy.

There is nothing less certain than that those who have teeth naturally separated are exempt from seeing them decay, and if it is so supposed, the reason is, that this kind of denture is of very rare occurrence; still we find that among those, who have such, there are cases in which the caries is well established. Thus, therefore, the insulation of the teeth is not their sure preservative; but it only affords the means of sooner perceiving their decay; and it appears to me, that the true cause of caries of teeth too close together has not hitherto been known, because learned men have so often repeated, that these bodies are inorganic, and do not admit of any circulation in their tissue, and

* Martial and many of the ancient authors. M. Duval, in a recent work, entitled, *Advice of the Ancient Poets on the Preservation of the Teeth*, and also M. Lewain, in his pretty little work dedicated to the ladies, have gathered together a quantity of verses in which the beauty of the teeth is celebrated.

because, too, dentists themselves, though having so many proofs to the contrary, have not dared to contradict their masters. It is now time that positive experiments should destroy this error. The bone of the tooth is not merely sensible, *but* even *very* sensible; of which I shall at another time give many proofs. I must now content myself with citing only one. If after having filed a tooth in such a way as to remove the enamelled layer, we pass a hard body over the denuded bone, the subject will expeperience the most painful sensation. This phenomenon is more especially observed on teeth that have been shortened; and the younger the subject the more painful is the sensation. There are many persons who cannot endure the filing of the extremity of a tooth. In many of those, in whom this operation has been performed, the teeth are very much pained by contact with cold bodies, for a period of longer or shorter duration, even until the calcareous phosphate, that is carried to it, formed an osseous cicatrix.

Nutrition, therefore, is carried on in the teeth as in all the other organs, and those of them that are too close together, decay in the points where it [nutrition] is intercepted by pressure, which are precisely where no particles of the aliment can centre. The caries, then, commences in some of the crystals of the enamel, in which the circulation has been stopped by compression; thus the extremity of a finger that is tightly bound with a cord, dies, and gangrene is developed, thus too the branches of two trees, which strongly press upon each other, become weakened and decayed; but one of our fingers will not decay, if held, even for a long time, in matter that is in a state of decomposition. Consequently I think it proper to separate close teeth, not only in order to facilitate their arrangement, but also to favor the circulation that is carried on in their enamels. I likewise think it useful to remove the angular points that prevent certain teeth from being brought within the circle. As to the rest, the operations of pure precaution may be deferred until the age of fifteen, sixteen, or seventeen years, because at these periods of life, the teeth have acquired a hardness and accretion sufficient to make them but little sensible to the action of the instrument, and because, moreover, as I have before, in the

course of this work, remarked, the maxillary arch having attained all its anterior extent, there is no longer any hope that the teeth will be regulated without the succors of art.

We can only account for the repugnance that is manifested to the artificial separation of the teeth, by the opinion which is generally entertained, that the enamel is necessary for their preservation. Certainly the author of nature may have intended to secure these organs, in furnishing them with a hard, polished and scarcely sensible covering, that prevents the aliment, the heat, the cold, &c., from acting on the substance of the tooth itself; still, the principal intention of the enamel appears to be, to prevent the rapid attrition of these bones, which, in the human species, are only covered with it, but which in animals destined to subsist on very hard vegetables, receive it into the interior of their substance. Such are the horse, the elephant, the mouse, etc.

If the extremity of an incisor be broken by a fall, or by a pebble found in the food, or if we shatter a tooth that is too long, etc.; it never decays in consequence of these obliterations, unless the ganglion has been uncovered or the jarring has occasioned severe accidents.

In the kind of caries produced from external injury, we are forced to file or cut* a considerable portion of the tooth; and the operations, instead of doing injury, secure what is sound, therefore the enamel may be removed without danger, and if teeth, after having been filed, decay, we must seek for the cause in some peculiar disposition of the subject; this is the opinion of the most celebrated surgeon dentists of Europe.

Many respectable dentists† have advised to remove some of the teeth of second dentition to give a little more room to the rest, but this means appears to me to be inconsistent and not at all recommendable. I consider a good tooth a treasure which ought to be preserved; for that which it pleases you to remove

* See my Odontology, in which I have proposed this means as having one advantage over the use of the file, in that it removes the caries without making gaps that are disagreeable to the sight.

† See Bourdet, Gariot, page 217; and other authors.

would perhaps have lasted longer than the one you would have saved, and I never would determine on such a sacrifice with the sole intent of giving ease to the teeth that are already well arranged, the passage of a file, therefore, appears to me to be preferable; but, while on this subject, I would remark that the large and thick files of dentists' are not suitable for the separation of teeth that are not decayed; because with them we are obliged to commence the operation at the cutting edge, and are seldom able to reach the neck, without cutting the gum, and there then remains a sort of corner that prevents the desired approach. I have, therefore, for a long time, successfully substituted for these, small *slender* and pointed files,* that allow me to effect the separation, by commencing near the gum, and then proceeding to the cutting edge of the tooth.

It is not less advantageous to shorten the incisors and conoids when they are too long, and more than one person has owed the attrition of the caries, the loosening, and final loss of his teeth, to the supernatural length of those that correspond to them. In effect, let us suppose that, in such a case, those from below, continually strike the superior on the lower end, they then fatigue them, and determine there a painful sensation that occasions an inflammation of the periosteum of the central ganglion, from which various casualties arise.

I have seen several persons, whose inferior anterior teeth, struck before the superior and forced their cutting edges into the gum, and made them bleed at every occlusion of the mouth. The same is sometimes the case with the superior teeth, that hack the inferior gums.

In all these cases, the consequences of which it is prudent to foresee, advice should be given to shorten the teeth that are of more than ordinary length. As to the rest, I cannot too often repeat, that this operation is not injurious to the teeth on which it is performed, whether with a file or with an excising forcep.

From what I have just said, which is only the result of rigorous experience, it appears that the file, when prudently used,

* I am indebted for this means, to my father, who was formerly Surgeon Dentist to the Court of Sweden.

is not a dangerous instrument to the teeth, its employment is sometimes useless, but never occasioned the loss of these organs.

If the beautiful arrangement and regularity of the teeth give grace to the physiognomy, they are still of so much more importance to the health, that we cannot too much promote or determine these. When there is a proper symmetry in the two dental circles, they fall plumb upon each other, and mastication is performed with ease, but if any tooth juts out of the row, and strikes the corresponding one, it renders it painful, loosens it, and the patient in consequence is forced to avail himself of the aliment before it is sufficiently penetrated with the saliva, from which result difficult digestions.

We may also remark that the calculus more easily collects on teeth that are badly arranged and separates them from the gums; which become choked up and bleed with great facility. The removal of the tartar may heal them for a time, but the evulsion of one of the teeth and the correction of the rest can alone prevent a relapse.

We should endeavor, in every case, to prevent the accumulation of this disgusting filth, which we see, with regret, disfigures the mouths of so many fashionable persons. I know many who would think that they were wanting in cleanliness, were they not every day to cleanse the different parts of their bodies with soap and other cosmetics; but who with unpardonable neglect, forgot to pay the least attention to their teeth, and thus leave them to be covered with a yellow plastering, whose superposed crusts finally acquire a considerable degree of thickness. There are ever some individuals who are vain of the indifference that they affect, to the preservation of these precious organs, and who, not only disdain the assistance of the surgeon dentist, but do not bestow upon them even the attention which *decency* demands. But are the diamonds of which some are so vainly fond, of more value than a fresh and finely ornamented mouth? And do some persons, by the eclat of their toilet, hope to compensate for the disgust that a disagreeable breath always inspires?

Why does the learned man whose mind is so capable of instructing, express himself with so much difficulty? It is because caries or tartar have deprived him of half his teeth; while

those that remain are threatened with approaching destruction. He is, it is true, little disposed to have them cleaned, and still less to have those he has lost, replaced; but ought he not to give something more to his auditors, than continual jets of saliva, which oblige them, either every moment *to wipe their faces* or to keep at *a* respectable distance?

Surely a man that would take too minute a care of his person, would become intolerable to society: this weakness can scarcely be excused even in the amiable sex, whose exterior charms so captivate us; but excess in every thing is contrary to good taste. Still, while avoiding all effeminacy, we should not fear being accused of affectation for preserving all our organs in a state of health. If we do not wish to please, let us avoid at least being disgusting.

Quid, si præcipiam, ne fuscit inertia dentes,
Oraque susceptia mane laventum aqua?

We cannot, therefore, too much recommend to young persons the daily care of their teeth, to which they at early periods should become habituated, in order to derive from it that freshness of the gums, which so much delights us. It is for them to preserve that bewitching whiteness of the teeth which we admire in others, even when we deny ourselves an ornament that costs so little, and which is becoming to persons of every age. A brush, whose hardness should be relative to the sensibility of the gums, will ordinarily be sufficient to remove the slime. A little *chalk*, *charcoal*, or any other convenient dentifrice, may now and then serve as an auxiliary. But we should place no confidence in those powders that owe their celebrity to the cream of tartar or oxalic acid, which whiten the enamel, only by destroying one of its layers every time they are used. Those dangerous acids gradually destroy the calcareous phosphate which is the base of the teeth, and expose the gelatine; so that these small bones, whitened for a time, soon grow yellow, and finally become sensible to the slightest touch, by the very means that were used to make them more brilliant. Such I have observed are the effects of the too frequent use of acidulated powders and liquids, in which some speculators do not hesitate to mix even the mineral acids, whose perfidious action gives them eclat only to destroy the most solid part of the teeth.

CHAPTER VII.

TARTAR, OR CALCULUS OF THE MOUTH.

TARTAR, stone or *odontolithos*, is a calculous substance that collects upon the teeth. Various analyses have been made of it, both by French and foreign chemists; but every analysis given of it, has necessarily differed from another, because the tartar thus analysed was taken from subjects of different temperaments, of which circumstance the analysers appear to have taken no account. This strong substance, however, is far from being of the same nature and containing the same principles in all individuals; thus, for example, the black dry tartar which is found in small quantities around the necks of the teeth of persons having a good constitution, dissolves with difficulty in muriatic acid. The yellow, dry tartar of persons, called bilious, dissolves much more readily, while the white, soft tartar, of mucous temperaments scarcely at all soluble in the acids, is readily dissolved in the alkalies. This last contains a great proportion of fibrin, but the others have more of the terreous basis. Exact and comparitive analyses of the different sorts of odontolithos, are yet to be made, and I do not doubt that great difference will be found to exist between them. Though chemists should have taken every precaution that could have rendered their labors of utility to the physician, there still would remain a question to be discussed, which is infinitely of more importance to the physiologist. It consists in the solution of the following problem.

Whence proceeds the calculus of the mouth? Is it, as some have said, a secretion? Is it a deposite, as has been repeated again and again, of the saliva, as stated in every medical work that has appeared for centuries? or, is it not rather a diseased terreous exhalation of the mucous membranes of the gums?

Jourdain and some others have supposed, that the small glands scattered over the periosteum of the teeth, secrete the

tartar. Gariot simply observes, that it comes from the gums; but a late author announces that he has discovered some *dental glands*, which should more properly be called *calculars:* as if nature had furnished a system for this noxious formation. But is not this author too hasty in supposing their existence? The small glands that he thus designates, may perhaps belong to the mucous and salivary systems, for the saliva, as all physiologists know, is not furnished by the parotid glands alone, but also by a great number of calculus kennels, which are very observable in ruminating animals, distributed over different parts of the mucous membrane of the mouth. I therefore think that this is a gratuitous supposition on the part of this author, because children of a very early age are not affected with tartar, and it is on them that he thinks he has discovered the glands which produce it. Did these really exist, they would, instead of decreasing, augment in volume, as age advanced, and their functions being more and more established, they would be very large in old persons and those who are subject to tartar. Now there is nothing to lead us to suppose their existence in these individuals. To suppose, therefore, that organs without functions may be very large, which, when they have them, cannot be discovered, is contrary to sound physiology; were we to do so in this case, the *dental glands* of the author would be wholly different from all others, which are the more decided the more they are in action. This supposition being inadmissible, I do not believe in the existence of these glands, which I have patiently searched for, but in vain.

Notwithstanding the opinion of some surgeon dentists-experimentalists, the most accredited hypothesis in the formation of odontolithos, is, that the terreous salts contained in the saliva are precipitated by a chemical agent, and gradually deposited on the teeth where they are agglutinated by means of the mucus of the mouth.

This supposition is admitted by the English dentist, Fox, and is generally followed, without examination, by most of our modern elementary works; it is, say they, by analogous means, that the calculi of the bladder, the kidneys, the gall vesicle, &c.

are found.* But has this interesting point of physiology, and pathology, been considered in every point of view? Calculi are found not only in cavities, designed to serve as reservoirs for certain fluids, but they are also met with in the stomach and intestines of some animals, in the articulations of gouty persons, in the peranchyma of the liver and lungs, in the thickness of the muscles, and, finally, in the brain itself, where they have been mistaken for osseous portions of its substance.†

It is, nevertheless, worthy of remark, that the mucous membranes as well as the sinovial glands, and those that furnish the mucus, are more especially liable to the production of concretions. Thus they are frequently found in the tonsils or amygdales, in the nose, the maxillary sinus, the external auditory conduit, the articulations, &c., whence it appears to me more natural to suppose them to be the product of an accidental exhalation of the sanguinary capillaries, to which the mucous and sinovial systems are much disposed.

Veterinary physic furnishes us with proofs to the point of what I have advanced. M. Dupuy, professor of the veterinary establishment of Alfont, has demonstrated that the mucous membranes of certain animals are subject to a disorder that he calls tuberculous, which consists in the formation of a fine gravel that is found in the thickest parts of their tissue, and whose analysis gives almost the same products as the other stones.

Surely these sorts of concretions as well as those that are found either in the nose or in the maxillary sinus, &c., can only come from a diseased exhalation of the membranes, *since there is not in these places any other fluid than the mucus; and even it remains there but a short time.*

In the same manner the exhalents of the gums appear to me to furnish tartar; they give out more or less of it, according as the gums are healthy or inflamed, the blood that penetrates their capillaries contains more or less calculous earth. This is

* Vide Researches on the Causes of Gravel, by Magendie, 1818. The Dictionary of Medical Sciences, and an Essay on the Chemical History and Medical Treatment of Calculous Disorders, by Marcet, London.

† Vide the Anatomy of the Brain, by Dr. Gall.

a remark to which I have often called the attention of my pupils that have been present on my visit to the orphan asylum, or at my private consultations. When the gums are diseased, they are covered with a whitish layer, which is soft at first, but gradually collects upon the teeth, where it hardens. When they are not inflamed they do not produce it, so that we sometimes observe the teeth on one whole side of the mouth, where the gums are very sound, not having a particle of calculus on them, while on the opposite side, where inflammation does exist, there is a considerable quantity of it, yet the saliva bathes the whole of this cavity. This observation may easily be made, 1st. In children that are changing their teeth; because, on the side where the moulting is going on, their gums are more or less irritated. 2d. On a person who habitually has no tartar on his teeth, but who, being attacked with a fluxion in only one of his cheeks, is affected with a catarrh in the mucous membrane of the mouth. The side affected presents a viscous saliva, or gums covered with slime, whilst on the other side there is nothing of the sort. If we remove the cheek with a spoon, and observe the oozing of the saliva, we shall find, it is true, that it flows in greater abundance than usual, but yet is very limpid. 3d. If we examine the saliva that comes immediately from the parotid, without having entered the mouth, but diffuses itself over the cheek because of a fistula in the conduit of the gland, we shall see it fall, drop by drop, without being viscid; if we then collect and analyze a portion of it, we shall find that there is no calcareous phosphate in it; but if, from the same subject, we take the saliva of the mouth, we shall discover that it is more or less mucous, and that the terreous salts are the more abundant, the greater the proportion of mucus. 4th. The conduits of Stenon were removed from a horse,* in order to obtain the fluid which is secreted by the glands, and, on its being analysed, no calcareous earth was found; concretions in the conduits of this animal are frequently found; they, consequently, must be the product of an exhalation from the mucous membrane that lines the conduits, and not a deposite of the saliva which passes over them.

* An experiment made at the Veterinary Establishment at Alfont.

I have, in general, observed, that in such a state of health as the subject is usually in, whatever may be his age or temperament, the quantity of calculus is in direct ratio to the proportion and consistence of the mucus. It is also in an increased ratio to his strength.* Thus, for example, the saliva of a good constitution, and in the vigor of youth, has an affinity for atmospheric air, with which it mixes so as to become frothy; it floats on the top of distilled water, and soon mingles with it; there is little or no tartar on the teeth; but as soon as disease or age has weakened him, his saliva becomes mucous, floats below the surface of distilled water, does not mix with it, and frequently sinks to the bottom. There is also a greater or less quantity of tartar in different parts of the mouth. The principal and quantities of the mucous portion of the saliva vary with the state of health, according to age and temperament; hence it happens that the calculus of the mouth is presented under different aspects; sometimes it appears in great abundance, as a sort of slime; at one time it constitutes a very hard and blackish body; at another, it collects in thick yellow crusts, &c.

The analysis of the odontolithos should, consequently, give results differing according to physical character. This is the case with other calculi, which always contain materials depending on locality. Thus, uric acid is found in those of the bladder; while the bezoars of the adipose vesicle are odorous by reason of the *debris* of vegetable matter which they contain, &c.

I have frequently observed, that when the mucous membrane of the gums, irritated by some local or general cause, has become inflamed, and the resolution has become imperfect, these results are a tonic obstruction, the gums continue swollen, and discharge with facility a red purple blood; and although they, before they were in this state, gave but little tartar, yet now they supply a good deal. Here the formation of the tartar is occasioned by a chronic catarrhal affection of the membrane of the mouth, which must be subdued, 1st. By removing tartar, and paying daily care to cleanliness. 2d. By resolutives and sometimes acidulated gargles, and finally by spirituous and astringent

* I mean by this, the natural strength of each individual, accidentally increased or diminished.

tonics; but if these means are not sufficient to restore energy to the vessels of the gums, which are afflicted with a species of debility, the embrocability of their tissue is destroyed, the calculous matter spreads over them, the dental periosteum dries up, purulent matter oozes out between the gums and teeth, which causes them to fall out by excavation, although they are perfectly sound.

Accidental or acute inflammation of the gums very easily passes to the chronic state, in persons who delay to have it reduced: to effect its reduction, we are sometimes obliged to have recourse to various therapeutic means, and though we cannot expect to prevent entirely the formation of tartar, yet we may very much diminish its quantity; to this end, repeated purges and vesications are, when properly employed, infallible means; I have frequently ordered them, and have obtained success, even after the fluxions had passed to the state of catarrh. It was, therefore, not without pleasure that I read, in the second article of an analysis of an essay on the chemical history and medical treatment of calculous diseases, by M. Marcet, a physician of London, that he had made the same remark in regard to the vesicular calculi.* Here the purgation acts by removing the seat of irritation.

When we reflect that persons most subject to odontolithos have foul tongues in the morning before eating, must we not believe that this disposition is generally throughout the whole extent of the intestinal membrane, and that these temperaments are very improperly called bilious? Do not the affections that are peculiar to them, rather depend on a disposition of the mucous membranes, which more or less abundantly secrete this yellow filth, that closely resembles soft tartar, and contains much mucilage?†

* See the Journal edited by M. M. Beclard, Magendie, vol. 1, p. 375.

† We may be assured of the truth of what I have advanced, by a very simple experiment, which consists in collecting the filth for a fortnight, with a tongue scraper, and placing it in a glass of water; we must decant the water every morning, and pour in fresh. It will then form, at the bottom of the vessel, a yellow or greasy precipitate, having all the characteristics of tartar.

From what I have just said, the formation of tartar may depend either on an idiosyncrasy of the gums, a local irritation, a general weakness of the solids, or, finally, on a superabundance of earth in the fluids. The true cause, therefore, can be known, not by a superficial examination of some parts of the gum, but by a close inspection of every part of the mouth. The tartar that is the result of local inflammation, generally encrusts only on a few of the teeth; it is hard, and the gums are sound in every part where it is not present; it is found on teeth that become painful in consequence of inflammation in the periosteum. That which depends on an idiosyncrasy is spread over the whole mouth, and may be of considerable consistence. That which is deposited in consequence of general weakness of the vessels, is small in quantity, white or yellow in color, and thickly impregnated with mucus. The gum is swollen, soft and slimy, such as we observe in persons attacked with scorbutus. That which results from a superabundance of earth in the humors, is frequently dry and hard; it concretes upon all the teeth, and is thickly packed upon the gums, causing them to swell, but not depriving them of their firmness. This last sort is found on aged persons, and those of a bilious temperament; in the greater number of instances, the tongue is continually covered with a foul yellowish coat.

Men are not alike subject to calculus of the mouth, in all climates of the globe. In general, the travellers that I have consulted on this subject have assured me, that in Asia, Africa, and in all those regions where the heat is great, the teeth are good, and but little affected with tartar. The same is the case in elevated and temperate countries; but in places that are cold, marshy, and subject to fogs, the mouth easily contracts a catarrhal affection, which produces much filth. But without extending our observations so far, do we not find that the gay inhabitants of Provence generally need but little assistance from the dentist, while in the western parts of France, such as Harn, Dieppe, &c. there are multitudes whose teeth are bad, and thickly encrusted with tartar.

As it regards age, children generally have but little tartar, unless they are in a bad state of health.

Adults have more of it, especially after having passed their thirtieth year, and advance towards old age.

It is in the last periods of life that the mouth presents the largest quantity of it, because then the calcareous earth, that abounds in our humors, becoming superfluous, exudes by means of the exhalents from the mucous membranes and the skin.

As to temperament, persons of a sanguineous temperament have but a small quantity of tartar; those of mucous, much; those of a bilious more; and its chemical and physical characteristics vary in each.

The relative state of health in each temperament also causes the proportion of tartar to vary; and the physician will profit by the remark; for the more abundant formation of tartar, where there is no local inflammation capable of determining it, is a consequence of a weakness in the solids of the subject; whence a change in the qualities of the fluids results.

If we turn our attention to the bladder, in order to study, by analogy, the formation of stones, we shall be led to apply the same principles; when we remove a sound that has remained for some length of time in this cavity, we frequently find it covered with a calculous incrustation at different points, although the patient has never experienced any thing announcing a disposition to gravel. In my medical practice, I have had frequent opportunities to observe such cases, and a very remarkable one is recorded in the Journal of *Sidillot*, for July, 1818, which gives an account of a soldier in good health, in whom a sound was employed to prevent the obstruction of the uretary canal. "Having been neglected, it remained in the bladder for seventy-nine days; at the end of which time it was resolved that the operation of lithotomy should be performed, in order to remove a calculus that was attached to it, and which prevented it from being withdrawn; but the patient fearing 'the bistory,' had the sound pulled out by main force. It was found to be covered with thickened mucus, which had entirely blocked it up. It was corrupted on its surface, rough for the distance of two inches, and bore, on the extremity that had been in the bladder, a urinary concretion, that was rough in its appearance, of an oval form, and about the thickness of an almond." It appears

to me to be evident that, in this case, the presence of the sound determined, on the parts of the membrane that it touched, a slight irritation, the result of which was an exhalation of a concrescible substance, for had that sort of petrifaction been contained in the urine, properly so called, it is certain that all parts of the sound which had been in the bladder, would have been alike covered with it.

The analysis of the products of the mucous membranes, shows that there is a great proportion of terreous salts in them, it is not, therefore, erroneous to suppose that the source of these salines terrene animal concretions, is in the capillary system of these vessels. Would it not be possible to take nature in the act, by analysing first the urine of an animal that had never before been subjected to any experiment, and then removing one of the writers in order to collect the urine that comes from the kidney alone, and make the same analysis of it? By the means that I propose, we should be able to appreciate the additions which this liquid receives while remaining in the bladder, and to discover the qualities of the terreous salts that are deposited by the mucous membrane of this cavity, just as we find that the saliva when it comes from the glands is limed and soapy, but by mixing with the mucus of the mouth becomes foul, stringy, and sometimes acidulated. Thus, therefore, as I believe it to be demonstrated, that *tartar is furnished by the mucous membranes of the mouth*, so also I think that the calculi of the kidneys and the bladder, as well as the very abundant sediment, by which the presence of certain diseases is conjectured, come from the urinary mucous membrane. This opinion may give rise to some considerations, into which I cannot, in this work, enter. For example, the gout more especially effects the articulations, and frequently determines inflammation there. I have from curiosity dissected several persons who had been but for a short time afflicted with the gout, and I found their sinovials were only inflamed, but when the disease has been of long continuance, there is a deposite of a calcareous substance. The capillaries of these membranes, therefore, deposite tophacious materials, which are consequently the effect and not the cause of chronic inflammation, of which the articulations of gouty persons are the seat.

Again the gall does not contain any adipose, which, however, is found in the calculi of the vesicle; consequently, the mucous membrane must secrete this substance, which protects it from the irritating action of the gall, as it also does that which comes from the exhalation of the cerum of the ears, where also we meet with petrifactions. In birds, the material for the shell of the egg, is furnished by a peculiar secretion of the intestine membrane.

In ruminating animals, a small piece of wood that has not been digested in the stomach, and whose stay there is often prolonged, determines a slow irritation that is followed by a salino-terreous exhalation, which by accumulating and fastening itself to this foreign body gives rise to the formation of bezoars. Finally, is it not manifest, that the small calculous masses that are found in the stomach of the craw-fish, are furnished by the membrane which lines this cavity?

The mode in which these concretions are formed in other animals, has led me to these various reflections on those that are met with in different parts of the human body, especially the bladder. Indeed, we frequently find some foreign body at their centre, which has been accidentally introduced into this cavity by the uretary canals; now, a small pebble, for example, cannot change the nature of the urine, or increase the natural quantity of the uric acid, &c.; but it irritates the urinary mucous membrane, which becomes inflamed, contracts a catarrhal affection and exhales terreous salts—the base of the calculus enveloping the foreign body.

If we operate on the patient, the disease is rarely reproduced, because the cause is no longer existing, the irritation of the mucous membrane ceases, and the operation otherwise changes the mode of sensibility of the bladder; but if the catarrh has passed to a habit, there may be a relapse.

Were the kidneys destined by nature not only to secrete the urine, but also to separate from the blood the terreous salts which are discovered when an analysis is made of the urine, that comes from the bladder, the operation of lithotomy, would only be a means of affording momentary relief to the patient, but could not radically cure the disease; for, scarcely would the

calculus be removed, and the wound cicatrised, before the urine would deposite anew the calculous matter; so that it would be necessary either to operate once a year, or every six months, or to keep the patient under a severe and slightly nutritive regimen, to which few would submit, and which, indeed, they could not endure.

It appears to me, therefore, that all the various petrifactions that are met with in so many different tissues of the economy, indicate a mode of formation independent of all prior suspension of calcareous earth in a fluid, and subsequent precipitation, thence, by a chemical action. I accordingly suppose, that the saline materials contained in the article blood, penetrate in consequence of a chronic local affection, into the capillaries of the different systems, whose exhalent mouths allow them to exude.

I will here terminate these observations by remarking, that the opinion which I have for a long time entertained, in relation to the mode of formation of calculi in general, appears to me to be very like that of Hunter's, which may perhaps give it some weight. This celebrated surgeon also intends to compose a special work on this subject, but if he has ever published such an one, I have never been able to procure it.

Although the ideas that I have just thrown out, have their origin in my intimate conviction of their truth as regards the calculus of the mouth, and although they differ from those of physiologists, after whom M. Magendie, in France, and M. Marcet, in England, have published two very good treatises; the former, on gravel, and the latter, on vesicular calculi; I would nevertheless observe, that the means which they point out to prevent or cure calculous diseases, would also be those to which we should be obliged to resort, to prevent the formation of tartar, did we not possess the advantage of being able to apply, to the mucous membrane of the mouth, the local remedies proper to oppose its accumulation. Finally, every regimen tending to diminish the quantity of terreous salts that enter into the composition of our bodies, will be a preservative from odontolithos, as well as from the other calculi.

CHAPTER VIII.

REFLECTION ON THE CASUALTIES THAT ARE OBSERVED DURING THE DEVELOPMENT OF THE SECOND SET OF TEETH—LOCAL AFFECTIONS THAT IT IS ESSENTIAL TO DISTINGUISH FROM THOSE WHICH RESULT FROM A GENERAL DEFECT—ASTHENY OF CHILDREN.

The period of second dentition is for man, as for other animals in which it occurs, the moment at which he ceases to be immature and becomes adult.

As the skilful pilot, sitting tranquilly at the helm, knows how to avoid the rocks, so may the medical philosopher, by a wise manœuvre, make childhood surmount the sometimes dangerous passage which separates it from virility.

Though the moulting of the temporary teeth be a natural operation, yet it is frequently attended with local and general irritation. The part of the gum which surrounds the tooth about to be moulted, is almost always slightly inflamed, a slight irritation is also present a long time before, and sometimes even small abscesses are formed, but these do not very frequently appear, unless the temporary tooth be carious. Thus, from time to time, we have had occasion to observe the destruction of the anterior wall of the alveolus, and the appearance of the root of a temporary tooth through the gum. These slight accidents, however, rarely exercise a deleterious influence upon the teeth of replacement, unless they are accompanied with caries of the maxillary bone; and have been occasioned by some general disease.

They manifest themselves more especially at certain periods of life. Thus, the ossification of the bicuspides commencing between the third and fifth years, we observe that children of this age are subject to troubles which can only be attributed to this cause. They are sensible of a dull aching in the jaws,

which renders them peevish, although they cannot be said to experience any constant pain. It frequently happens, that the milk molars decay, that their periosteums inflame, and that they establish on the gum small flexions, followed by fistulas; otherwise, they are but slightly troublesome. It appears, therefore, that the development of the replacing tooth, which is carried on between the roots of the temporary tooth, gives rise to these inflammations. If children in this state are placed under the care of the surgeon dentist, he should, without resorting to extraction, neglect no means to relieve them. He should, consequently, bleed the gums with the point of a lancet, and order them to be rubbed with some emollient resolutive, so that he may avoid extracting them, an operation the more painful, because the temporary molars, at five or six years, have very strong roots. Parents, therefore, cannot be too deeply impressed with a sense of the service they render their children, when they have their mouths examined at the tenderest age, for it is essential that the milk teeth should be so cared for, as to prevent, if possible, the pain which is experienced in them. It is wrong to suppose that the child may be deprived of them, under the pretence, that as they must one day fall out, it is immaterial whether they are lost sooner or later. The child that has been deprived of teeth at too early a period, masticates with difficulty, and the digestive organs suffer from it. It is, therefore, necessary to employ all possible means to preserve them, until the time when they should be replaced. But from a want of attention, it too frequently happens that the caries of these teeth determines an irritation in their periosteums and then in the gums; which obliges us to extract them prematurely, in order to prevent the formation of abcesses, or that a fistula may not be established on any part of the face. In important cases like these, caries of the jaw and mortification of one or several of the dental germs is to be apprehended; it would, therefore, be imprudent to delay the extraction of the milk molar that causes the evil. When it is done, we find the roots of this tooth surrounded by a thick fungous periosteum, an exhalent of pus, the source of which it was very urgent to drain. From these remarks we see that although we may fail to preserve the tem-

porary teeth, it would nevertheless be the part of inexperience to allow them to remain, when by their remaining they would occasion accidents, whose importance would surpass the loss of one or even more than one of them. But if we perform this extraction at a tender age, we may injure or even remove the germ of the bicuspid, and thus deprive the child of an adult tooth. This accident is especially liable to occur in extracting a superior temporary molar, because its roots, three in number, are frequently very much bent, and converged towards each other.

From among the examples that I have collected, of children, some of whose bicuspid teeth were not renewed, on account of the extraction of the temporary molars at a tender age, I will choose those that were found in the orphan asylum, because they were seen not only by me, but also by the pupils who were present at my visit.

Augustine Burnet, aged eleven years, and of a good constitution, when not more than four years of age, had the four temporary molars of the lower jaw attacked with caries, which, in consequence, were extracted by a surgeon. One of these molars was replaced about six months ago, by a bicuspid; but the alveolar edge, where the others should come, is very narrow, which leads me to suppose that there is no hope of the teeth of this series ever adorning the mouth of the child.

To this example, taken from a public establishment, I could add many more, taken from my daily practice, for, having been obliged, by important considerations, to make a premature extraction of some milk molars, I have twice found the germ of the subjacent tooth between the roots. Still, when it has not been removed, and the increase of the tooth continues, notwithstanding the osseous canal, which we have called the *iter dentis*, has been injured, and the appendage of the matrix lacerated, yet the cicatrization of the jaw may produce a great obstacle to the shooting up of the bicuspid and the appendage upon which the absorbing apparel is developed; the destruction of this cicatrix can only be accomplished with great difficulty, and may not ever be effected. We perceive that various accidents may result from this source, which will cease only when an artificial perforation of the osseous cicatrix has been made; for on this

operation the life of the patient may depend. Jourdain has given us two examples of such cases. He reports several instances of children dying of nervous symptoms, arising from the odontocie of the bicuspides becoming impossible, in consequence of an osseous cicatrix; and adds the judicious observation, that many of these young beings are victims of similar unknown affections.

I have generally observed that the unseasonable evulsion of a temporary tooth retards the odontocie of the one that is to replace it. Thus, from a young lady, when five years old, there had been extracted, I know not for what reason, 1st. A central incisor; 2d. The two lateral incisors; 3d. The four first molars. Never had one of these teeth been renewed, although she was nine years of age, and the great superior incisor left her, as well as the lower incisors, were properly moulted and replaced. The edge of the gum where the bicuspides should be, being very narrow, it is probable that she may be deprived of them forever. Had the operator who committed this ravage known the consequences, surely the parents of this poor child would not have had to regret their loss.*

I have just seen a young lady, seventeen years of age, with very good teeth, from whom an English dentist took, when she was not more than five and a half years old, two temporary central incisors of the lower jaw, under pretext of facilitating the shooting up of one of the replacing teeth; but the tooth that should have replaced one of those so prematurely extracted, seemed never able to show itself, for the gum is compressed, and there will exist, through life, a very disagreeable deficiency. It is probable that, in removing the temporary teeth, one of those of replacement was injured, or the membranes that enveloped it were torn, which caused it to prove an abortion.

It would be to pass the limits prescribed me, and lead to the

* Unhappy is it for those who fall into the hands of rash dentists, who have not studied anatomy. To pull teeth and to set them is their business: One of this class, one day, having gone into a boarding school of young ladies, extracted a number of temporary teeth, at the same time observing, that it would push on the others, and thought it necessary to extract as many more, when the frightened mistress stopped this petty carnage.

consideration of a multitude of diseases, were I here to treat of those which manifest themselves during the formation and appearance of these organs, that now engage our attention. I ought, however, to make some remarks on the affections to which children are more especially liable during the first ten or twelve years of life, and which, in consequence, have some connection with second dentition. Although the jaws are then the centre of a very active operation, that appears to attract a great quantity of fluid to the head, yet I am far from supposing that the development of second dentition can, alone, determine this afflux; but as it serves to increase it, we should not forget that, during this period, sanguine congestions are frequent in different parts of the brain; that, especially, nasal hemorrhage is very common; that mucous, and sometimes sanguineous ptyalism is observed in feeble children; and that obstructions of the glands, especially those of the neck, as well as those that border on the jaws, are very common. These obstructions have peculiar characteristics, that distinguish them from those which are of a scrofulous nature. *Heat and pain are the companions of the former; indolence and almost insensibility* the accompaniments of the latter.

Diseases of the eyes and ears, scaly eruptions on the scalp, morphew of the face, are some of the affections which manifest themselves during odontophia, and which frequently disappear as soon as it is terminated.

During the two first septenaries of life, therefore, the operation of dentition frequently complicates diseases, and at other times is complicated by them. At the period of the development and moulting of the teeth, it is often advantageous to divert, by some external means, the irritation of which the mouth is the seat, and which manifests itself by swelling and bloody or mucous exhalations of the gums, leading parents and sometimes even physicians, to mistake them for scorbutic affections. Some children, moreover, are troubled with anorexia, which depends solely on a nervous irritation in the interior of the jaws. The teeth at this period are more easily coated with tartar, the mastication becomes bad, in consequence of the looseness of the temporary teeth, and in many instances the stomach

digests with difficulty. It is necessary to remove the tartar, because it increases the irritation of the gums, besides, this operation also relieves them of superfluous blood.

Consequently, it is necessary to do away the impression, adopted without reason, that the teeth of children should not be touched until they have attained their fourteenth or fifteenth year. The operations for beauty alone may be deferred to that period; but it is incumbent on us to employ remedies, when their employment is necessary, and not to suffer caries to destroy a part of the teeth, before the time arrives, when custom no longer opposes our employing means for arresting its progress; for then we may repeat the old adage: After the death of the patient recourse is had to the physician.

A collection of observations that I possess on the subject which here engages my notice, has demonstratively assured me that the accidents which especially depend on odontocie, are more peculiarly developed at the instant when the crown of the tooth is ready to pass through the exterior orifice of the appendage of the dental sac or matrix.* In first dentition it appears that the epidermic pellicule, which closes the gummy opening, is broken with difficulty by some young children; and that in second dentition the prolonged sojourn of a temporary tooth, whose root has not been sufficiently destroyed at the period of moulting, forms a mechanical obstacle. Finally, accidents sometimes occur because the absorption of the gum that covers the molars of either dentition is not effected in a given time.†

The 10th of June, 1815, I was called to see a child, five and a half years old, that had been suddenly attacked with convulsions, without any known cause. I was apprised that for some days it had had a bleeding at the nose, and complained, though slightly, of pains in the gums. I examined the mouth, and perceived that a first permanent molar was ready to shoot up from below. I immediately lanced the gum, and at the expiration of half an hour, all the convulsive symptoms ceased. The next day the points of the tooth were visible. Fourteen days after,

* This is applicable both to first and second dentition.

† See the work of Gariot on the Diseases of the Mouth.

the same symptoms manifested themselves anew; the baths, that had been vainly employed before, succeeded no better now. I was called in a second time, and supposed that the corresponding tooth of the other side, one of whose eminences appeared ready to show itself, might be the cause of the distress of the child. I made a section in the gum, like the one on the parallel side. The symptoms ceased and were never again renewed.*

* Although it does not enter into my plan to engage myself at present, with first dentition, yet I cannot let the opportuuity escape me of offering a remark from which practitioners may derive great advantage. The accidents depending on odontocie, are, as I have just observed, manifested during the space of time that the tooth employs in traversing the thickness of the gums, they are more powerful, as the tooth is nearer the stomatic opening of the dental matrix, which is covered over by the epidermis of the mucous membrane. Here it is probable that the forced dilation of this canal and the opposition of the epidermis, which is not readily separated, give rise to troublesome symptoms. Nevertheless, it does not appear to me, that the compression of the trunk of the dental nerves result from it, because the walls of the alveolus are ossified at the period of odontocie; but there may be an irritation of the ganglion, a part of which is not at this time ossified, and we know that repeated titillations, even on parts less sensible than the dental pulp, frequently determine grievous consequences. Thus the presence of worms in the intestines, and titillations on certain parts of the skin, occasion convulsions. I saw at the orphan asylum, on the 15th of last January, a child of two years old, very strong, but showing a great disposition to grow. The four first molars, although only two incisor teeth had sprung up on each side of the jaw, announced themselves at the same time: then followed itching of the gums, diarrhœa, insomnolency, convulsions: during the course of a single night, the odontocie of these four teeth was completed; afterwards there was an abatement of these symptoms: the child was thought to be out of danger. A few days after, the odontocie of the cuspidati renewed them, and the patient previously weakened with its sufferings of fifteen days, sunk under them.

When the first important symptoms are manifested at the shooting up of the teeth, we should not then temporise; *an opening into the orifice of the neck of the dental matrix should be exactly made;* but as it is not seen on the gums, it is indispensable that we acquire, by dissection, a precise idea of its position, so that we may not make useless and painful incisions. This slight operation may save the life of the child, provided it be well performed, for when it is not, it aggravates the evil by causing inflammation.

I have several times performed the division, and always with advantage. If those who have used this means have not obtained the success they

A second difficult odontocie may give rise to accidents, when it is carried on with too much rapidity, that is, when several shoot up at once.

I might cite many examples of this kind, but I will confine myself to one only; taken from the practice of the learned Dr. Gall.

Mademoiselle, a niece of one of our ministers, eight years old, of a sanguineous and very nervous constitution, complained of some of her milk molar teeth, whose crowns were almost entirely destroyed. Her sufferings were not sufficient to determine her to have the teeth removed. Soon after, a slight cough, a dilated pupil, increased irritability and insomnolency, compelled her to have recourse to a physician, who ordered anodynes, and waited to combat the subsequent symptoms. There was, however, a continuation of the same symptoms, without its being possible to discover any characterised disease. Then followed great increase of fever by day and delirium by night.

During the remission, complaints of pain in the tooth.

M. Gall then inspected her mouth, and having seen the bad state in which it was, and perceiving the summits of adult teeth, that were sticking between the debris of the temporaries, he advised that I should be called in. It appeared to me that second odontocie, by acting with too much promptitude, had determined these symptoms; in fact, a great incisor of the right side, two medial incisors, and four bicuspides, presented their crowns at the orifice of the appendage of the dental matrices. The absorption of the temporary roots, had not, in a manner,

hoped, they did not free the canal, and the obstacle consequently did not cease to exist. The knowledge of the mechanism of odontocie, is, therefore, very important.

Finally, the milk teeth, while yet enclosed within the jaw, are, as I have observed, placed obliquely, so that in order to loose the sack, it is necessary to follow the direction of the cutting edge of the tooth; to which we wish to give an outlet, without this, although the instrument may have touched the tooth, the operation is imperfect. In the course which I give each year, to the pupils of the hospitals, I point out to them, directly, on the subject, the place where the small incision should be made, and the direction that should be given it, according to the sort of tooth, for which it is necessary to open a passage.

time to be accomplished, and several of these teeth were pushed forward by those which came up behind. The gums that surrounded them were red and sensitive.

I extracted the two teeth that seemed to me to form the greatest obstacles. The same day there was a cessation of the fever, so that it was not thought necessary to annoy the child further, who had, moreover, made much opposition to our wishes.

Four days after, there was a removal of the primitive symptoms; another visit on my part; and extraction of the two temporary molars, which appeared to me to prevent the shooting up of the bicuspids; then a diminution of all the symptoms, and a few days after perfect convalescence. This interesting example may serve as a guide in similar cases, and prove how much odontocie may influence the health of children.

But adults themselves are not exempt from diseases that result from the shooting up of the teeth. Those called the wisdom teeth occasion very grievous ones, which have been noticed by many authors. We have seen abscesses, obstructions of the glands and gums, swelling of the parts that compose the cheeks, inflammations of the mucous membrane of the mouth, fistulas, obstructions of the jaws, neuralgia, which have only ceased on the extraction of these teeth. The operation is, in these cases, one of the most difficult in surgery. It is, therefore, very fortunate when the simple loosening of the gums suffices.

There is a disease that is very rare among the wealthy, but very common among the indigent. It especially manifests itself about the period of the moulting of the temporary teeth. It is frequently observed on children that appear to be sound, as well as on those that have scrofulous or scorbutic affections.

Can it be a peculiar disease still unknown? M. Duval has already noticed this disposition; among the great number of children that are continually brought to the orphan asylum, I have frequent occasion to observe singular complications of this affection, which are modified according to the differences of the strength, sex, and idiosyncracies of the different subjects. In some the lips and gums are of a beautiful, bright rose color; in others the lips are rosy, though the gums are pale; or both of them are reddish and much swollen. Sometimes also the gums

are pale and the lips of a deep red, there is besides no scorbutic or scrofulous symptoms; frequently the child is robust and appears to be quite well.

It begins to experience troublesome itchings in the gums; they ulcerate around the necks of the temporary teeth, which become separated from them, and somewhat loosened. If the symptoms continue, the evil is propagated, a burning pain is felt in some parts of the buccal membrane that lines the cheeks; and ulcerations of a greater or less size are formed there. To these evils are joined some others—painful swellings in the glands that environ the lower jaw, the entire separation from the gum, and loss of undecayed teeth, whose roots are frequently surrounded with a yellowish mucous tartar. I have even known portions of the alveoli to exfoliate, and then the cure is effected almost naturally. Whatever may have been the importance and continuance of the local maladies, I have observed that, if children reach their seventh or eighth year, their second teeth are not damaged by the cause that occasioned the loss of the first; they are only badly arranged by reason of the want of development in the maxillary bone, which shows that during the disease the general ossification is carried on but slowly.

Chilblains of a bad character are the portion of these children, their skin is terreous or wan, there are some whose flesh is soft, their eyes dull, their habit of body languid, and, finally, they have true scrofulous obstructions. Believing that I have, in these cases, found that the general weakness depends on that of the digestive organs, whence result divers degrees of alteration in the vivifying properties of the fluids. I employ with success, bitters and tonic powders, such as Jesuits bark, the small centaury, &c.

For the local treatment of the gums, I recommend acidulated gargles as those in which I have had dissolved some grains of sulphate of zinc. If these means are not sufficient, I have the ulcerations cauterized every day with dissolved *argentum nitratum*. Many may be cured by these simple remedies; but I have sometimes been obliged to have recourse to actual cautery from which I have derived great advantage. Several, however, in whom the disease was very violent, have sunk under it, after having experienced the following symptoms.

General swelling of all the stomatic membrane, ulceration on one side alone, prostration of strength, slight pulse, redness of the affected side, avidity for food, burning thirst, then, at the expiration of three or four days, a gangrenous spot (resembling an anthrax) either below the cheek bone or about the lips; rapid increase of this spot, which, at first livid, becomes black the same day, and, when grown to the size of a five franc piece, separates in the middle, and forms an obstinate ichorous ulcer, whose pale edges roll upon themselves like flesh exposed to the action of a very brisk fire. The whole of one side of the face is soon entirely devoured; the bones are uncovered as well as the roots of the teeth, which, however, are not carious, but fall out of themselves; a hectic fever consumes these unhappy beings, to whom death is too tardy a relief. This sad scene has passed before my eyes in the cases of two children, one of them eight, and the other a girl of nine years old. Death seizes them, between fifteen and twenty days after the attack of the first marked symptoms, notwithstanding all the rational means employed, such as tonics and caustics. These are the characteristics, which an inveterate cancerous affection, with all its horrible scent, would not exhibit. This disease has been so well described by M. Barou, that we cannot but profit by his reflections and try the means recommended to be employed by him in similar cases.*

In general, the female sex is more subject to affections of this nature than the male. At least, such is the case at the orphan asylum. The dissections, that I have made of several children, attacked with this disease, and in different stages of it, have always presented me the bones singularly softened. Those of the jaw, especially, are very easily cut with a scalpel. There is, consequently, but a very small quantity of calcareous phosphate in them, but their teeth do not appear to be the less hard on that account; on pressing the cutting edges of those which have shot up, we perceive them bend, and, as it were, sink again into the jaws.

Some authors, it seems to me, have referred this kind of dis-

* Vide le Bulletin de l' Ecole de Medecin de Paris, 1816, page 136.

ease to a sort of scrofula; but, for reasons, which I find myself compelled to detail, I do not believe this opinion can be adopted, because the seat of this last affection is in the lymphatic, whence it may be propagated to different systems, while the affection, the symptoms of which I have just described, has its seat in the *organs of nutrition, and in the fluids that are conveyed to them.* Moreover, in the beginning of the disease, there are no obstructions that can reasonably be regarded as of a scrofulous nature, but such may occur as it gradually progresses and propagates the disturbance in all the secretions.

This vicious disposition, which I have frequent opportunities of observing in the asylum to which I am attached, is sometimes innate in children, and sometimes acquired by their suffering great privations of nourishment. In the former case, they are melancholy and grow for a long time without complaining of any pain; both their dentitions are very tardy, the bones of the jaw as well as those of all parts of the body, are exceedingly slow in their development, the membrane of the lips and mouth is pale, the saliva, mucous; these children are meagre, their skin soft, which has led me to adopt the word *astheny*, to denote this state, for it designates the want of strength that exists in all the tissues of these little beings, whose nutrition is effected with extreme difficulty, without there being any possibility of attributing the cause of it to a distinct disturbance of any organ separately considered.

There appears, therefore, a want of vitality in all the apparels which causes the child to waste away daily, and the natural functions to be performed with a sort of supineness. It has no appetite, is frequently constipated, at other times it has diarrhœa, but no fever, it is timorous and nervous, has a melancholy air, and, in short, excites a sentiment of compassion. It seems as if sanguification could not be effected; for in these subjects the blood is very serous and almost colorless. After what has been said, it is not surprising, that the organic exhalents of the bones should not supply them with scarcely any calcareous earth, but with a material, that is without consistence, acidulated and rather destructive than reparative.

Exercise in the open air, generous wines, sometimes even a

little alcoholic liquor, and a diet not exuberant but consisting of succulent viands, form a part of the regimen, which, in these cases, it is indispensable to follow. It is necessary to prohibit milk and acid as aqueous aliments. To arouse the vitality, I have constantly and successfully employed the *juices of cruciferous plants, the black oxid of iron, the small centaury, the gentian and the quinia in powders*, but with this last medicine I think it useful to unite opium, which diminishes its action on the digestive organs.

I banish the use of ptisans, which generally fatigue the stomach, vesicatory and purgatives are employed, but with much circumspection, and only when there is some reason for displacing an irritation communicated to some interior organ.

I have, I think, said, a little above, that, during the course of odontophia, many children suffer from obstructions of the lymphatic ganglions which environ the jaws, and also of those of the neck. As these are of two kinds, it is necessary to know how to distinguish those which are the result of a sympathetic irritation, from those which are of a really scrofulous nature; it is to be observed, that there is only one period, at which it is possible to distinguish them; this period is that, in which the determing cause acts; for if the obstructions are prolonged and pass to a chronic state, we can attain unto their etiology only by going back to the moment of attack and to the symptoms that were then manifested.

The obstructions of the ganglions by sympathetic irritation, are always announced by a painful sensation, not only in the places that they occupy, but also in the surrounding parts. It is the lymphatics that environ the salivary glands, and not, as is commonly supposed, the salivary glands themselves, which commence to swell; these last, however, may be consecutively affected. If the irritation is communicated to the lymphatics of the neck, the patient experiences a distressing sensation along their traject, which produces what is called *torticollis*. There is also a redness of the skin; and the obstruction is ordinarily dissipated without much pain. But in those subjects where there has not been a sufficient febrile reaction in a given time, the inflammation disappears, and the obstruction passes to a chronic

state. It may be easily confounded with that which is of a scrofulous nature; the more so, as the physician is not usually consulted until the swellings, of which we here speak, have come to possess the same degree of indolence.

Antiphlogistics and emollients should be employed to remove these swellings, which, even very frequently disappear of themselves, a short time after their occurrence.

But if they reach the chronic state, we can scarcely obtain their resolution, but by remedies capable of reviving the vital energy that appears to be benumbed in these ganglions. Thus, local friction with a rough towel, calomel taken in small doses, (for example, four grains a day for some weeks,) may succeed in many cases.

I ought here to observe that this affection has nothing in common with that which is called the king's evil, that also manifests itself on children during the development of the second teeth.

Placed by the nature of my business in an advantageous position for observing and treating scrofulous obstructions, that frequently accompany second dentition, I will take the occasion here presented, to offer my reflections on the subject. This work, moreover, being designed for those who are engaged in dental medicine, I hope that they will not find these observations inappropriate, because they cannot know too well how to collect the indications which may enable them to recognise these obstructions, since the treatment, that is proper for them, differs entirely from that which should be employed in the preceding case.

Obstructions in the absorbing system without the manifestation of inflammation, is called scrofula. It has been attributed to a thousand causes, essentially differing from each other, among which dentition has not been forgotten.

Consequently, it has been said to give rise to a multitude of diseases, many of which have no analogy with it, so that according to some authors, scrofula would be a very Proteus.

Were we to consider the obstructions of which we are speaking, only in an hospital, and consequently on individuals on whom this affection had influenced the vitality of the different

systems; we would truly be inclined to think, with M. Lepeltier, that it is a *peculiar disposition in all the organic solids.* But he that is placed in an asylum where children are admitted before they are in a very advanced stage of disease, has an opportunity of following the development of scrofula, and of finding that its etiology and semiology are still far from being perfect.

The following are the observations that have led me to these remarks. They were collected at the asylum, and can be verified by gentlemen of the profession. Among a very great number of children attacked with indolent obstructions in the lymphatic ganglions of the parts about the jaw and neck, there are some with great varieties of constitution: some have fresh lips, bright red gums, teeth short and well arranged, solid enamels, and are of a sprightly character; their skin is fair and good, their limbs well developed, &c.

Others present a brown skin, dark red lips, dull eye, and are of a melancholy character; others, again, have all the indications that authors ascribe to constitutions which they call scrofulous; an etiolated skin, swelling of the lips, edema of the face and of other parts of the body, indolency, &c. Finally, it is found in all the intermediary temperaments; and, what is remarkable, in every class of society, although it may be truly said scrofula is more frequent among the poorer classes, and in very humid countries, than any where else.

These sketches afford matter for deep reflection, in order to compare, without prejudice, the different expositions that celebrated physicians have given of the mechanism of the formation of scrofula.

Sauvages, Cullen, and a great number of learned practitioners of our day, such as M. M. Baumes,* Hebreard,† Pinel,‡ Salmades,§ have treated it as a particular depravity, susceptible of being conveyed over the different tissues. M. Lepeltier,‖ extending his ideas still farther, appears to admit that a multitude of diseases are of a scrofulous nature.

* Memoir which has obtained the prize of the Medical Society.
† Essay on Scrofulous Tumors, 1802.
‡ Philosophical Nosology. § Diseases of the Lymph.
‖ Complete Treatise on Scrofulous Diseases.

M. Broussais,* who is much more cautious, believes that it is purely an accidental disease, *and consists of a sort of inflammation proper to the vessels and glands of the absorbing system;* whence there results an injury to their functions, not, as his predecessors have said, from weakness, but from *super-excitation.*

When so many celebrated men have argued on so delicate a point of pathology, it will probably appear very singular that I should dare to give my opinion also. I will, nevertheless, do it, for the profit of pupils, and with the hope, if I err, a just critic will be found to expose my errors.

The most ancient opinion, and that which appears to be the best founded, is, that *scrofula, in its simple state, has its seat in the absorbing system.* The first appertain to *immediate assimilation*, the second to *the decomposition of solids*, and the third to mediate *assimilation.* Nevertheless, nature has united these with such intimate relations, that, although the functions of each sort are very different from the rest, yet physiologists have not thought proper to make separate systems of them.

Those which serve for immediate assimilation, have their mouths opening into the digestive canal, and are called chyliferous. They are terminated in an order of ganglions called mesenteric, that are destined to act on the product of digestion.

Those which serve for decomposition are situated in the very thickness of our solids, how hard or soft soever they may be.

The third sort have their mouths placed on all the various surfaces, and in all the cavities. They terminate in ganglions scattered over all parts of the body, where what they have collected undergoes certain changes, that render it susceptible of re-entering the current of circulation without occasioning any disorder in it. The intestines themselves, therefore, have two sorts of absorbents, those which serve for assimilation, and those which enter into their own substance, as organs subject to the law of decomposition. The integrity of the first is essential to the blood's receiving by them its great means of reparation; thus even the slightest injuries in them induce a prompt alteration in that fluid, whence results a vicious nutrition, and consequent weakness of the solids.

* Examination of the Medical Doctrine, p. 141—7.

The affections of the others do not bring with them effects so rapidly calamitous, because, if the fluids that they carry have been vitiated by the substances which they have pumped from the surfaces, the deleterious principles are weakened in the long space they have to pass over before they are mixed with the chyle, whose good qualities, in ordinary cases, neutralise or even stifle the others. The organic sensibility of the chyliferous absorbing vessels would be disturbed, were there to be introduced into the alimentary canal any substances which nature never designed to serve for our alimentation. At first the mouths of the absorbing vessels would refuse to take them up; they would, nevertheless, become gradually habituated to their presence, and finally sieze upon them, and introduce them into the white vessels which would carry them to the mesenteric ganglions; but, having arrived there, and remained before them a longer or shorter time, in order to undergo the action that is indispensable to convert them into chyle, these hurtful substances would necessarily experience a new opposition on the part of these ganglions, which would in a manner refuse to act on them. Consequently, there would be irritation and swelling of these organs, which, if the same cause were to act for a certain length of time, would become diseased, and lose their aptitude to fulfil their functions. Such, I think, is the mechanism of the development of the mesenteric affections.

The same thing appears to me to take place in the formation of scrofula, under the skin, and in the deep seated organs receiving a number of lymphatic ganglions, but there is this difference, that the efficient cause, instead of injuring the organs of digestion, acts on the exterior absorbents of the body. The infusion, therefore, comes, both in the chyliferous vessels and in the lymphatics properly so called, from the circumference towards the centre of circulation, and their diseases will proceed, 1st. Those of the intestinal canal, by *res ingesta;* 2d. Those of the exterior surfaces, by *res applicata.* This system of vessels does not effect the nutrition; it is the exhalents that are charged with this important function, as Bichat, in his General Anatomy,*

* The article Lymphatic, in the Dict. of Medical Sciences, will be read with interest; it has been treated in a masterly manner by M. M. Adelon and Chaussier.

has so clearly demonstrated. Now the exhalents are the termination of the arterial system; thus, therefore, if it is well established that scrofula has its seat in the absorbents, we cannot say it is a fault of nutrition; I know not that I can offer more certain proofs of what I have here laid down, than the remarks made a little above, that scrofula is found in the best constitutions.

But if the scrofulatrix cause acted by *res ingesta*, there would be a rapid impoverishment of the blood; and, in effect, this is what is observed in subjects who have mesenteric affections.

To recapitulate, a constitutional weakness in the contractibility of the mesenteric vessels and ganglions, or the use of aliments capable of disturbing their organic sensibility, will cause their obstructions.

A residence in places deprived of air, and of the beneficial light of the sun, and every thing that prevents or suspends the cuticular secretion, will make excrematal humor flow back into the lymphatics.

The absorption of heterogeneous substances, such as the terreous filth that is collected on the skin of those persons who do not bathe, or who wear their linen too long, will give rise to external scrofula, then, gradually, by reason of the numerous anastomoses of the absorbing vessels, to scrofula in the organs more deeply situated.

If this exposition appears correct, and based on physiology, we must admit that many authors have erred, in attributing to a scrofulous defect entirely opposite diseases, as, for example, osteo-malaxia and the formation of calculous tubercles, which appear to me to result from two very distinct affections of the nutritive exhalents.

We should, therefore, look for the reasons of scrofula, or mesenteric obstructions, 1st. In an innate or acquired idiopathic disposition of the absorbents in some individuals; 2d. In the application of the producing cause, which will be found either in the *ingesta*, or in the *applicata*.

Indeed, all the exhalations of a country where obstructions of this sort are epidemic, are not affected by them, and all those who are exposed to the action of their causes, do not contract

them. Consequently the two circumstances above mentioned, are indispensable for the development of the strumous affection in any subject.

Let us call experience to our aid, and see what passes around us: Of several children, begotten and reared by parents that have or have not had the scrofula, only one is attacked by it, although the regimen is the same for all the little family; there is, therefore, in this one, only the single circumstance of temperament, which disposes him to it.

On the other hand, I know a father and mother, who, as well as seven out of nine children, had had the scrofula, having changed their place of residence, and ceased to live in Holland, where this disease is frequent; they came into the south of France, bringing with them two children of a very tender age; these last, reared under a serene sky, are not affected with scrofula.

These two examples, to which I might add many others, taken from my practice, have led me to believe that the matter of insensible perspiration,* condensed on the body by cold or by the thickness of the dress, and taken up again by the mouths of the absorbents, determines the obstructions of the ganglions, not only in children, but also in all adults whose delicate skin is very perspirable, whatever, otherwise, may be their regimen of life; but they are necessarily less frequent in those who oppose to the debilitating causes with which they are constantly surrounded, a tonic regimen and an active, unrefined life, by means of which their organs preserve the faculty of repelling whatever hurts the economy; yet, if there is a continuation of the application of the causes, the absorbents will be injured throughout a great extent of their ramifications. Soon the exhalents will participate in their state of suffering, and the economy of nutrition will be deranged by them; for such is the fragility of organized beings, that when one system is disturbed in its operations, all those with which it is connected will soon experience a derangement in theirs. Proper nutrition, therefore, appears to

* Man loses, by this means, much terreous salts, water and acid, and alkaline matter.

me to be only consecutively prevented, when there exists obstructions in the chyliferous or lymphatic vessels.

The attention of physiologists cannot be too much directed to the injuries of the exhalent system; may it not be possible that all the pretended osseous tubercular excrescences that are found in all the tissues of the economy, are nothing more than the product of exhalation? We may follow, step by step, the formation of some of these concretions, by studying them, on those which are found under the tongue, and which are called *frogs*, [meaning a tumor.] At first a small sac is developed, and there accumulates in it a very limpid mucus, which, not being in contact with the atmospheric air, cannot be dissipated, yet this mucus is found to be gradually replaced by a very hard, calculous mass. How is this phenomenon produced? Nothing appears to me to be more simple. While the exhalents, on the one hand, supply, the absorbents, on the other, carry away; the mucus undergoes the changes of a liquor whose most fluid part is evaporated; it becomes thickened, a *meliceris* is then formed; and afterwards an *athérome*. Finally, this becomes a true petrifaction; sometimes, however, calculous exhalation takes place immediately, as in the formation of tartar, and of certain stones found in other parts. In these cases, the exhalents act the chief, and the absorbents the second part.

Who will assert that the same thing does not occur in the formation of tubercles? Thus, an irritation of some kind determines an obstruction of a lymphatic ganglion, the sensibility of the exhalents that enter into the composition of this ganglion is found called into play; they furnish more than they are wont, and thicken the coats of the vessels, as they convey matter that was before foreign to them; thence arise all the disorders that are the consequence of exhalation, either veritable pus or a more compact substance.

If the organic sensibility of these vessels be re-established, they will not furnish any more morbific matter, and the interstitial absorbents will re-establish the primitive dimensions of the organs. For such is their energy, that, to restore order, they will dry up the soft matter, and consume the hardest bodies.

These different considerations have brought me to the con-

clusion that there is no scrofulous taint, and that parents attacked with this affection do not necessarily transmit it to their children; yet, as it is well established that children are disposed to contract diseases analogous to those of their parents, I believe that if they are placed under the influence of causes capable of inducing it, it will be developed with more facility in them than in others; but if they are removed from such influences, they will be preserved from it.

The same considerations have led me to conclude that it is not a vice of nutrition, although it may consecutively make an impression on it.

Finally, I think it essential not to leave in the same class the diseases of the chyliferous ganglions, and those of the lymphatics, the softening of the bones, the cold depositions of the articulations, &c.

There is another idiosyncrasis that appears to me to be improperly attributed to a scorbutic affection. It is found in children belonging to the weakly class of society, as well as in those who, deprived of the first necessaries, painfully live in the midst of want. In these children the gums are swollen, and bleed easily; the lips are red and thickened; in the least cold, the lips and cheeks become like marble; they have chilblains in various places; but yet these subjects have no tendency to scurvy, and we cannot attribute it to a deterioration of the qualities of the fluids; their blood, instead of being serous, is rather too much charged with red particles; it is thick, and has no resemblance to that which is the result of real scorbutic affections, in which there exists weakness of all the systems, liquidity of the blood, as well as a manifest diminution of its vivifying properties; for, although chemical experiments made on the blood of scorbutic persons, have not been able to demonstrate in what it differs from that of man in health, yet, it is nevertheless true that, in this disease, the properties of this fluid undergo notable alterations; which only demonstrates the insufficiency of instruments of art to aid us in our researches on the principle of life, and proves the necessity physicians are under of withdrawing themselves from all exclusive systems; for, instead of only pruning what is bad, they cut down entirely, and lose that which is

good. Such has been the case with the humorists, the solidists, the Browneans, &c.

I know several young persons, born with the constitutions of which I have just spoken, who, having been obliged to enter the army, either in the north or south of Europe, and, after having endured all sorts of fatigue, were made prisoners of war; they were thrown into prison, or transported in English pontoons; surrounded with wretches, who perished of the ravages that scorbutic diseases commit in those confined places, and subjected to the regimen of life as their companions in misfortune, they were, nevertheless, not tainted with scurvy, and, on being liberated, by the blessings of peace, to their families, they continued to enjoy good health.

I know other persons, who, with a similar disposition of the gums, have an ardent, active spirit, and do not experience any other inconvenience than a prodigious quantity of tartar, which causes a successive loosening of the teeth, and determines their loss; but as soon as some of them have fallen out, the gum grows firm, and the obstruction is transferred to those which remain, until the jaws are entirely degarnished, and then the affection disappears.

From these examples, it is certain that the phrase *scorbutic affection* is misapplied; for the man in whom it really exists, would, without doubt, be he in whom this frightful malady would be developed with the greatest facility; but since it is not thus, this obstruction of the gums can only be considered as being simply of a varicorse nature, and peculiar to certain very sanguineous individuals. It is observed in subjects of very different nervous sensibility; I have noticed it in children, in active adults, and in indolent persons.

Consequently, M. Laforgue, to whom dental surgery is indebted for a good treatise, is wrong, when he asserts that all who present a like dispostion are tainted, in different degrees, with the scorbutic vice. He seems to have confounded those individuals whose blood is abundant and red, and whose capillary system is constitutionally much distended by it, with those in whom this fluid has but part of its qualities. I believe, with many physicians, that the blood is not the same in different constitutions;

that it differs in color and consistence; and that, if the red part is found in abundance, it penetrates into the capillaries of the gums and lips; but I do not think that this effect can result only from a scorbutic disposition.

Still I am far from denying the existence of affections of this nature; I, myself, have had occasion to observe some of these in the orphans of the asylum; but then, to the invariable indications that are noticed in the mouth, some more certain are added. The child is indolent, its cheeks are continually purple, its figure full and as if it were puffed up, the flesh soft, the limbs partake of this disposition, its blood stagnates in the least cold; these subjects are little irritable. Sanguineous diarrhœa, as well as passive hæmorrhages, continually exposes them to perish. We observe, on the extremities, bluish scales, which the least knock opens, and from which ulcers very difficult to heal may arise; finally, were we to abandon these patients to themselves, the scurvy would appear, and conduct the unfortunate beings to the tomb.

These children, which are seldom met with except among the poor, have been reared on aliments of the worst quality, such as salt provisions, ligumes, and indigestible roots; many of them before the termination of dentition. It is, therefore, from the want of having well studied the characteristics peculiar to affections essentially different, but some of whose symptoms are analogous, that anti-scorbutics are so frequently recommended, when a sanguineous swelling, whose cause is frequently local, is observed on the gums; so that those for whom they are ordered, fear that they are marked, and even tainted with the scurvy; a puerile fear, to which I have opposed facts drawn from experience.

I have made a number of observations which have convinced me that the *specifics* designated by the name of *anti-scorbutics*, are injurious in the affections that I have just described as not being of a *scorbutic nature*, and which are peculiar to certain constitutions, where the red part of the blood predominates. These remedies farther excite the circulation of this fluid towards the capillaries, and exalt the sensibility which, in most of these subjects, is already too decided.

Thus, the removal of tartar, friction with a brush capable of producing local bleedings, acidulated gargles, lemonade, and whey taken internally, are the true means to oppose this disposition, which at first is very remarkable during the moulting of the teeth, but sensibly diminishes until the second dentition is terminated, but which is never entirely effaced. As to affections essentially scorbutic, quinia, cruciferous plants, generous wine, etc., are remedies whose well known action needs no apologists. But it is no part of my subject to employ myself on this disease.

It is easy to perceive, from what I have said, that advice of the physician and dentist are alike necessary during odontocie: happy is it in some circumstances, when the one can supply the place of the other. The art of conducting dentition is, therefore, the domain of the *dental physician*, and not of the *mechanical artist*.

CHAPTER IX.

STOMATIC SEMEOLOGY.

After having followed the secondary teeth in their different stages of formation, viewed them placed in their alveolar edges, and taken a *coup d'oeil* of the affections that are developed at the different periods, and which, consequently, may have some connection with odontophia; it remains for me to complete the task I have imposed upon myself, by considering what are the signs which indicate that these small bones will endure throughout life, or will only have a transitory existence.

To arrive at this knowledge, it is necessary to study long the different original constitutions of children, since they necessarily influence the temperament that they will have at an adult age.

Now I will undertake to prove that it is by the inspection of the teeth, that we can discover whether the innate constitution

is good or bad; this is an important trust and one from which the physician, in his practice, may derive great advantage.

But the teeth are not the only organs that we should interrogate. An examination of all parts of the mouth, and the fluids that it contains, should also be made, in order to make sure of the present state of health, and to discover whether the connate constitution has undergone any changes, either good or bad. There is nothing in what I have here said, that can surprise those who reflect that the organs of the mouth are susceptible of changes only as some slow revolution is effected in the organism.*

If we consult the treatise on semeology, we shall find there the indications of disease detailed with care; we shall also meet with some general ideas on those which cause us to know the health, taken in the largest acceptation of the word; but we shall there search in vain for the not less valuable signs of the relative health in each constitution, by means of which we can distinguish that peculiar situation of a subject, who, as it were, vacillates between health and disease, and only arrives at the latter, after having passed through all the intermediary states that separate both. These can only be known by an inspection of the mouth; and they have not yet been mentioned, except by intelligent surgeon dentists. I think I will render a service to my readers, by sparing them the trouble of recurring to the works through which they are diffused, because certain incontestible truths are, unfortunately, there found buried in hypotheses, which the present knowledge of physiology leads us to reject; but in pruning the useful boughs, let us do it so as to reserve the roots that should produce the fruit.

M. Daniel Lobstein, a physician of Bordeaux, has just enriched the literature of medicine with a translation of the Semeology of the Eye, by the German doctor, Loebenstein Loebel. This interesting work is a monument that attests how much light may be thrown on the difference of diseases, by the special study of the changes that certain organs experience; but, to

* I here except, as those who consider this article will clearly perceive, the case where a local disease has caused some ravage.

complete this semeology, it would be necessary to add to the examination of the eye, the relative states of health in each constitution.

Mahon, a dentist endowed with a talent for observation, has thought that man cannot be born with a strong constitution, unless he derives his life from parents who were in perfect health, and in the strength of age.

Still, he acknowledges that a child coming of such parents may be weakened by a lactation of a bad nature, as well as by the diseases that are so frequent in the first years of life.

He farther acknowledges, that a child born of weakly parents may become strong; but that it will always preserve certain signs of its primordial constitution; then carried on from consequence to consequence, by his own imagination, he thinks it possible to divine the inclinations of men by an inspection of their teeth.

Finally, the author assures us that he is able, by the same sort of physiognomy, to divine what were the temperaments of their parents, and the state of their health at the period of conception.

He expresses himself thus: "Does the child derive its life from unhealthy parents? Its milk teeth will have a viscous enamel; they will be charged and surcharged with a blackish vapor; and will, in a short time, be corrupted by a humid, putrefying caries."

"Where there is only a weakness or delicateness on the part of the parents, the enamel of the milk teeth is bluish, and they are disposed to a dry caries, that ordinarily makes but little progress, and rarely occasions pain."

"It was," continues he, "only by a firm resolution to observe very accurately the differences which I remarked on the teeth of a great number of individuals, that I acquired these first truths, which at the outset would be nothing more than mere conjectures, but which, by being increased day by day, have since become diagnostics, about the certainty of which, I dare flatter myself, I cannot be deceived. It affords me pleasure, to give an account here of a part of the means that I employed, to arrive at the point which was the end of my researches."

"When I perceived some signs, as, for example, shadowy lines on the milk teeth and those of replacement of different children, I set all my application to work to search for their cause, and when I thought I had found it, I questioned their mothers, who almost always confirmed my presentiments. I then proceeded farther; after calculations that appeared to me very probable, I ventured to fix the period at which a grand crisis, or a grand pain, that should have happened to them in such a month of pregnancy, and I have had the satisfaction to find that I had conjectured rightly."

"My hopes, founded on the same proceedings, have been crowned with success in the cases of *adults*, whose teeth, by the simple inspection of them, have given me an advantage not less valuable than the first,—that of knowing, very generally, whether they were born of strong, weak, or aged parents, and also, if the mother has had several children, whether they were among the last, etc."*

If Mahon had thrown the light of repeated dissections on his empiricism, he would have confessed, with Hunter, Blake, Mauro, Fox and Bunon, that the teeth of the second set do not begin to ossify until about the sixteenth month after birth; consequently, the good or bad health of the parent, at the moment of conception, cannot influence, in the least, the goodness of the second teeth of the child, since they are not really formed until after birth. What Hippocrates observes of them is very just, and although M. Baumes† has said the same, he only serves as a convenient translator. He acknowledges three generations of teeth, that is to say, three periods of ossification. The first emanates from the blood, while the fœtus is still in the matrix; this is all of the temporary teeth, that are already in part ossified when the infant enters the world. The second generation of teeth, *those which are formed from milk*, according to the father of medicine, will consist of the incisors and conoids of replacement, as well as the first permanent molars, that begin to be ossified during the continuation of lactation, which nature ap-

* Vide Mahon's Le Dentiste Observateur.
† Treatise on First Dentition.

pears to have settled at two years. Finally, the third generation of teeth *those which are formed of solid aliments*, according to the expression of the divine old man, will consist of the bicuspids, as well as of the second and third permanent molars; for we know that these teeth are ossified from the third to the twelfth year. It is certain, that if Hippocrates is the author of the book *de dentitione*, he had very correct ideas about the periods of the formation of the teeth, and, as it is probable that he had some notion of osteology, he may have acquired this sort of knowledge from the dried heads of children that had died at different ages.

It nevertheless happens with the teeth, as with the other parts of the body, that they greatly resemble the parents'. Thus we see persons with mal-conformed jaws, and teeth badly arranged, like their fathers and mothers; but their solidity appears to depend on the good health of the child in the first years of life, and on the quality of the nourishment that has been given it. If these, as well as the temperament of those who have given it life, are bad, the innate constitution is not ameliorated; and, in this case, we observe that the temperament of the child, being very analogous to that of its parents, does not vary during its growth. This is particularly observable in subjects that have been suckled by a mother, or a nurse whose temperament was similar to theirs. It is, therefore, very prudent that she who has teeth constitutionally bad, should abstain from suckling, and that this important function should be confided only to women having excellently constituted teeth; for it is by this means alone we can avoid transmitting to the child a very troublesome heritage.

One of the most essential things, as it appears to me, is to be able to discern, without hesitation, what happens when the subject passes from a state of health to that of disease; but he that is well, or nearly so, does not consult the physicians; hence it results that they direct their attention more particularty to man positively diseased; whereas surgeon dentists, called upon at every instant, by the same persons in health, are especially engaged with the means to discover its state.

Is it not the same with professional men, who are devoted to

other sorts of study? Gallin owes his glory to his knowledge of the pulse; the physicians of certain nations are obliged to rely on this guide alone, since they are not permitted to see the patient, when the person is a female. Would not Fouquet, the physician of Montpellier, who was too soon snatched away from science, have passed for a magician, if he had lived three or four centuries earlier?*

There are cases especially where the physician cannot be too well assured by certain signs, whether the present good constitution is innate, or whether it is acquired; for example, when a strange nurse is about to be chosen, can he be too scrupulous? The inspection of a breast where the gland is well developed, only shows the milk such as it is; this milk, that is good to-day, may in a short time become bad; but the examination of the different parts of the mouth will indicate that which it is so important to know; for lactation being a cause of debility, she who has been weak formerly must have the tendency to become so again; and in this case the milk that at first appears good, will soon become serous, and of a bad quality.

Having been frequently consulted in the choice of a nurse, I have always paid great attention to the constitutional state of the mouth, and whenever an infant, born of weak parents, or of those whose teeth were delicate, has been confided to a good nurse, she has procured for it good teeth and a good temperament, unless some heavy malady has rendered this precaution vain.

The semeology of the mouth alone can discover to the physician whether that woman owes that beautiful carnation to her parents, or has attained it from a very skilful regimen. I have collected some important facts on this subject, and I have met with some women who have had, for a long time, a great interest in keeping out of view that they had not always been in such good health as they appeared at the moment when they solicited employment.

I would not have it supposed that I wish to say that every woman who has excellent teeth is indubitably a good suckler; even

* Essay on the Pulse, second edition, 1818.

the most perfect constitution is susceptible of being deteriorated. We see, therefore, that, in order to judge well of the past and present state of health, it is necessary to collect all the signs that can lead to this knowledge, and that, to acquire it, it is also necessary to be for a long time exercised in these sorts of researches; for, as a beautiful carnation may mislead our judgment, so may pretty teeth be taken for good ones, which is a very different thing. This remark is very important in practice, because an infant, suckled by a woman who has teeth of a bad quality, very frequently has these organs similar to hers. I could support these truths, by a multitude of proofs, were they not so apparent, that it seems to me superfluous to cite them.

Physicians, as it regards regimen, may also derive much advantage by the inspection of the mouth: for, when one is required to point out the rules of domestic hygeine for the physical education of the child, can he admit of but one mode? Has he not, then, the greatest interest to be well assured of the innate constitution of each one of the subjects for whom his advice is asked, in order to have given them a nutriment adapted to the strength of their organs? Will he report only on a superficial inspection of the visage, its paleness, the color of the skin, all of which are so variable? Will he not regard the repletion or leanness of the subject, the state of the pulse, &c.? Surely he will make good inductions from all these things; but the minute examination of the mouth will give him, without doubt, the means of affirming his judgment; for, besides what we already know of the teeth, the mucous membrane of this cavity, receiving its color from the blood, varies according to the state of that fluid.

As it regards medical jurisprudence, when he is about to choose among a number of men those capable of enduring the fatigues of war, is it not necessary for him to have certain indices by which to discover them? Now, the color of the teeth, the greater or less quantity of tartar, and its consistence; the shade of the mucous membrane of the mouth, the nature of the fluid it secretes, are so many infallible signs that cannot be counterfeited; but which, nevertheless, have been neglected, because the physicians charged with the examination of recruits have

not studied them. Thus M. Laforgue observes that in those unhappy times, when every family was seen to raise yearly one or more soldiers, a greater number of young people perished in the hospital than by the sword of the enemy. The semeology of the mouth, with the state of relative health, is, therefore, important under several aspects.

Whatever may be the knowledge that a practitioner may acquire of the changes which a disease, or even a disposition to disease, may produce in the exercise of the functions of some organs, it is, at the least, advantageous to be able to conjecture what has happened in all the system at another time. In effect, can the physician, that is called in for a slight indisposition of a subject whom he scarcely knows, trust solely to the sabulous state of the tongue? Does not its aspect singularly vary? Is it not notorious that, in certain persons, it is continually red, white, yellow or blackish? I, as well as others, have had occasion to make these observations on persons who always had it thus, but without their being subject to any of those indispositions that are so ordinary in the course of life.

May not the beating of the pulse deceive the physician, when he is called in for the first time? Is it the same under the influence of all temperaments? Does it beat with regularity in all subjects, in the state of health that is peculiar to them? Professional men know the contrary.

Men may, therefore, be frequently born with dispositions that are peculiar to them, and with others which they derive from their parents; the last constitute hereditary affections. Finally, the temperaments are modified by a thousand circumstances in in the midst of which they are placed, and which are entirely extraneous to them.

The organs are consequently found to be susceptible of different modifications and changes; that which has been very robust for twenty years of its life, may, after a simple perspiration suppressed, a tetter struck in, or a syphilis badly treated, be found brought to the most perfect marasmus. How much, then, may the exterior deceive us. A large man, and one very strong in appearance, is frequently of weak constitution; in like manner, another is small and weak, but yet all his functions are

performed with ease. If the physician, called in by those who are in a diseased state, does not examine all the signs which may positively indicate to him the innate constitution of these individuals, is there not reason to fear that he will hesitate as to the means that it is preferable to employ, and that he will err in their choice? This will not happen, if he has recourse to the inspection of the mouth, the only guide that can never mislead the practitioner.

In our modern works, the semeology of the mouth, considered in its diseased state, appears to me to be incomplete; but that which is employed about the relative health in each individual, is entirely wanting.

Let us take a coup d'œil of the lips of several men, who may be said to be in their natural state: one has them pale; another, rosy; a third, red; a fourth, yellowish; one has them small; another thick; another, again, has them red on their edges, whilst they are very pale within the mouth; this one has them dry; that one, humid, &c. The like is the case with the mucous membranes of the mouth, and particularly of the gums, on which we may observe the same differences.

In order to be able to appreciate the value of the signs that are found in the mouth, and in the organs that it contains, it is not only essential to study them with that philosophical spirit that excludes all prejudice, but it is also necessary to resolve to verify what has been said of them by practititoners who have for a long time devoted their attention to this point, whether they be adorned with the title of *physician*, or whether they are only *surgeon dentists*.

It is well thus to take in hand the writings of semeologists, and see if they have omitted any thing that it is very advantageous to know.

It is also essential to ascertain if there are not certain indications in the mouth, whose place can be supplied by no others, when it is required to decide on the present state of the mucous membranes and the arterial blood.

This blood contains the materials necessary to the increase and maintenance of all our organs; each of them draws from it that which suits its own peculiar organization, either to appro-

priate itself, or to extract from it some principles from which its functions result. The state of health of each is relative to the quality of the fluid by which it is separated, and its products are necessarily relative to its integrity. Consequently, the general health results from that of all the system, the one influences the other; that the first may be perfect, it is necessary that all the wheel-work should be sound, pliant, and endowed with a sensibility that does not err either by weakness or by excess of strength: it is necessary that the organs which compose the digestive, circulatory and nervous systems, should perform their labor without disorder. Pythagoras defined health as "*the good state of the constitution.*" But does a perfect harmony often exist? And when it does, is it ever of a durable kind? How many causes tend to disturb it? Besides, as beauty is ideal and relative, so general health can only exist in the like manner; it differs according to the sex, age, and idiosyncrasies. From this last flows the combination of temperaments which differ so astonishingly among themselves, and yet present so many points of resemblance.

I will not attempt to describe the indications by which we may distinguish them; we know that we can only attain them with great difficulty, unless their characters are perfectly plain, which is extremely rare. Add to this, also, that they vary, not only in different but also in the same individuals, viewed at different periods of their existence.

Physicians, therefore, can only consider man in health, as under the influence of such and such temperaments; and the best of all having appeared to be that which they call sanguineous, they are accustomed to regard those who are removed from it, as having the least favorable; whence there are so many sorts of health, as there are of temperaments, whose shadings are infinite; for we cannot suppose that the organs which fabricate the fluids, as well as the fluids themselves, that in their turn nourish the solids, are in the same state in individuals of different constitutions or temperaments.

Vans Wieten says, in the aphorisms of Boerhaave, on which he has annotated, "That blood imprudently taken from a young, chlorotic female, is almost always pale; but that the patient be-

ing ordered the use of steel, oscillations of the solid parts are renewed, the vessels react with more efficiency on the humors, the swelling of the face is dissipated, the lips and cheeks are painted a vermilion red."

In speaking of the paleness of the blood, at page 294, Vans Wieten farther observes, "We see the red color of the blood shine and appear through the vessels of the membranes, in all places where the *skin fails*, for example, on the tongue, gums, in the interior of the mouth, nose, etc. When the above named parts have a pale color, it is a certain proof that the viscosity that *infects* the blood is not of an inflammatory nature, but of the character of a thick pituite."*

How many labors in medical chemistry are to be renewed? The lymph, the chyle, and the blood† have been well analysed; but are these comparative analyses? Have they been repeated on individuals of different ages, sexes and temperaments, or only on the same individual in a state of health, and afterwards in a state of disease? But yet this is the only means of estimating the differences and changes that our fluids may experience, in a multitude of circumstances.

It is only by attending to the result of the labors which it will be so necessary to undertake, that we can understand that which strikes our eyes; thus we know that the blood is susceptible of marked physical differences; for, as Vans Wieten observes, its color and other qualities vary to infinity. It is, therefore, necessary, in order to appreciate them, to make a particular study of them; and he who will devote himself to it, will of necessity make observations that have escaped the majority of his confraternity.

Now, on examination of the membrane with which the mouth is lined, and the greater or less quantity of fluid it furnishes to the saliva, would enable us to discover the predisposition of the

*The ancients called pituite, what we now designate by *mucosity, animal gluten, mucus*. They distinguish the natural or warm pituite, from the morbific or cold pituite, such as glair, &c.

†The arterial blood, being that which serves for nutrition, is that to which we should direct our researches, and not the blood of the veins.

digestive and pulmonary organs, and frequently even their present state.

The inspection of the lips and gums would indicate to us, with certainty, and without the need of bleeding, what was the consistence of the fluid that carries life to all the organs. The absence or presence of tartar should also be taken into consideration, in order to be apprised of the state of the mucous membranes; the observer should then direct his attention to the teeth, and from them he will find whether the actual temperament of the subject is that which nature appears primitively to have designed him to possess, or whether it is the effect of some fortunate or unfortunate circumstances happening during the course of life.

We easily perceive how much time, patience and study is necessary to acquire the habit of distinguishing, without hesitation, the changes that the different parts of the mouth may experience; it is, therefore, necessary to exercise our eyes continually, for when it is required to observe the different shades of which a color is susceptible, nothing can supply their place; finally, it is necessary to know the affections simply local, of which the mouth is liable, in order not to err in etiology. I will add, that the prognostic is the more certain as the subject has been known for a longer time, and here, while occupied with the indications that are found in the cavity of the mouth, I may repeat what Baillou says of the pulse: *that it is necessary to know it in a state of health, without which we commit mistakes.* How much less frequently would persons change their physicians, if they were fully persuaded of this truth.

There is no necessity to bring arguments to prove that the membrane of the mouth that furnishes a calculus, soft, abundant and without consistence, is not in the same state as the one that exhales none, or scarcely produces some that is hard, thin and dry.

I believe I have before demonstrated that the tartar which encrusts the teeth is not, as some suppose, a deposit of the parotid saliva; but that it is the result of a change in the vitality of the exhalents, that suffer the mucous membranes to be overrun by calculous earth that escapes from the sanguineous capillaries,

and which will not cease until the actual mode of the sensibility of these vessels is changed by means of proper treatment.

I will here call to mind what I have said of the saliva, in another part of this treatise, [see article on calculus,] "When this fluid has remained some moments in the mouth, it there acquires new qualities, according to the constitution of each individual, and according to the integrity or injury of the mucous membrane, or some of the organs that it covers."

"In subjects who are in the best health, and whose stomach and lungs are very sound, the saliva appears very scarce, because it descends into the stomach almost as soon as it is furnished by the glands that secrete it. It only remains during a space of time that is necessary for it to mix with a small quantity of mucus, and absorb a certain portion of atmospheric air, that renders it frothy. If this saliva is spit into a vessel of water, it at first floats on the surface, then soon almost entirely mixes with that liquid."

"On the contrary, the saliva of a person whose mucous system furnishes a great quantity, is stringy and heavy; it is charged with but little oxygen, contains a great proportion of azote and sulphur, and stains silver. When it is thrown into a basin filled with water, it sinks to the bottom, if the mucilage is in excess; or if not, floats in the middle; but it never mixes with the water. The salivary glands, in these subjects, probably furnish it more abundantly than in those of whom I spoke a little before; but the membrane of the mouth gives so much mucus, that they spit frequently, and have a very humid mouth."

In making an application of these observations, we find that those whose mucous system exhales too much fluid, have a constitution infinitely less happy than those in whom it produces but little. It is probable that the activity, which excites in this order of membranes, arises at the expense of other organs. On the other hand, the mucous fluid, having relaxing properties, insensibly diminishes the contractile energy of the digestive organs; which determines a bad chylification, and consequently an imperfect sanguification. The blood of these subjects is the more impoverished of the calculous matter, as the mucous membranes the more excite it; for, although in them the calcu-

lus of the mouth appears in little abundance, it is easy to prove that it is brought out in great abundance; but being without consistence, it descends into the stomach, instead of being collected on the teeth.*

If we fix our attention on this last product of the mucous membrane, it will afford us ample subjects for observation. In persons of the best health, it is scarce, dry and *black;* setting out from these, and descending to constitutions or temperaments less fortunate, we find it *yellow*, dry and not very *abundant;* in others it is *soft*, yellow and *scarce;* in others, again, it is soft, *yellow* and abundant, without consistence; in others it is soft, white and not very abundant; finally, in the worst constitutions, it is *very white*, without any consistence, and very abundant.

Can we say that these different kinds of calculus contain the same relative quantities of terreous salts, and that the exhalents that furnish them enjoy the same health? and can we better judge of the state of the circulating system in each individual, than by examining the small arteries that are situated almost immediately below the epidermis of the interior of the lips; since we may there, in some sort, behold the blood circulating, and distinguish its color and consistence?

We will farther perceive, that in each constitution the lips present notable differences, with which the physician should be acquainted.

We will observe that they are thick, red, rosy or pale, according to the subjects; which depends entirely on the qualities of the arterial blood, that carries the materials proper for the support of all parts of the body. The changes that we have noted in these organs, may, therefore, give valuable indications to practitioners.

Thus we see that several celebrated physicians, such as

* Persons endowed with the temperament called bilious, have much tartar; if it is removed, no other remarkable layer of it will be collected until the end of some weeks, or even months; on the contrary, in those who are mucous to excess, the teeth are covered every morning with a sort of whitish pap, which is nothing but calculus very much charged with mucus.

Boerhaave and Vans Wieten, have not forgotten to mention them, in giving a history of chronic affections.

Physicians who attribute all the injuries of our organs to a want of tone, or to their excess in solids, have suppressed the name *cachexy*, because it was invented by the humorists to designate the bad *disposition of the fluids*, a supposed cause of a great number of diseases. But those who are not exclusive, admit it, although they seem to dare to pronounce a reprobated word; yet they are well convinced, by daily experience, that our fluids may acquire bad qualities. Moreover, since we admit of scorbutic, scrofulous, syphilitic vices, where do they settle, if not in the humors?

M. Broussais has justly inveighed against the banishing of a term that has in it something more ridiculous than a thousand others employed in medical language: and he who wishes to describe the corruption of the blood in scurvy, and of the lymph in scrofulous persons, may he not do as well to convey his idea by the word *cachexy*, as by saying that *there are injuries of the solids or liquids?* Discussions of this sort are nothing more than logomachies. But, absolute as this expression is, M. Laforgue has employed it to describe two sorts of adulteration of the blood; the one is that in which the white part is too abundant, the other, in which the red part predominates too largely.

We will soon see by what signs we may be certain of the want of proportion in the materials of the arterial blood, and what influence it exerts on our solids.

If we direct our attention to the teeth, we shall see that their volume, length and color are very variable; in some they are short, large, uniform, of a heavy white; hard, thick about their cutting edges, and turn yellow in old age; the phosphate of lime predominates in them, and they are little impressible; it is among these individuals that you find the joyous convivialist, whose stomach is always ready to digest what his teeth are ever disposed to grind.

In others, the teeth are long, narrow, and, as it were, etiolated, tender; of an azure blue, and scarcely ever last until old age; the gelatin predominates in these, they are very irritable; sometimes, also, they are short and narrow; these belong to the

charming being, all of whose organs are as fragile as the teeth, and whose stomach cannot support the least excess in the ordinary regimen.

If we now examine the intermediums of these two extremes, we shall find very varied constitutions, which the attentive physician ought to know how to distinguish.

Thus, neither the pulse, nor the color of the skin, nor that of the fibre of the eyes, can speedily settle this want of proportion in the materials of the blood; the examination of the teeth, and of the other parts of the mouth should be added.

It should be known that teeth which are so pretty, of light blue, rarely last during the whole of life; but when they do, they turn gray, and that these subjects are the least vivacious.

As to the teeth whose crowns are short, hard and yellowish, they will still exist a long time, even after the destruction, by old age, of the individuals who possess them. It is among these persons, especially, that centenarians are found.

We ought to remark, that the color of the different parts of the mouth, and, consequently, of the blood, as that of the teeth, examined in beings of a like constitution, but of a different age or sex, also present some peculiarities. Thus, in children and women, it is more gelatinous and fluid than in adult men. That of an old man, in good health, is thicker, and contains more calculous earth.

Finally, I will observe, that we cannot rely on the inspection of gums around which much tartar is collected. To judge surely, it is necessary to take a coup d'œil of their whole extent; then, we see that they are frequently very pale, not far from a place where they appear as if inflamed, and even immediately above or below it, according to the jaw of which an examination is made. It is well, therefore, to remove, or have removed, the tartar, and not to draw the prognostic until some days after.

In general, subjects who have blood constitutionally very red, which is perceived from the very deep color of the lips and the redness of the gums, have teeth that are thick and solid, and which soon grow yellow by the constant and abundant deposite of calcareous earth.

Persons of a good constitution, having blood whose white

and red parts are well proportioned, have teeth that hold the mean between these two extremes, and, consequently, are *milk-white.* It is certain, from this, that the red part of the blood is that which contains the terreous salts by which the bones are nourished, while it is in the white that the gelatin resides; whence it results that the solidity of these organs differs according as the one or the other of their principles predominates.*

In truth, Duhamel and Haller, in their experiments on the formation of bones, have demonstrated that these bodies take the consistence that they have from the terreous salts only, as the red part of the blood arrives at some of these points.

The researches that I have made on the development of the teeth, have exhibited to me the same fact in relation to these organs; the superficial layer of the ganglion reddens before it becomes osseous,† whilst all below is altogether whiter; soon another layer reddens, is ossified, and then whitens, and so on successively.

There is an experiment that is easy to be performed, and which is worthy of the attention of medical chemists; it is to analyse the arterial blood of two individuals nearly of the same age, one of whom in the habitual state of health, has the blood very red, and the other very white; it is this on which I propose to rely, in examining the lips and gums. I am fullly persuaded, that the blood of the subject whose lips and gums are red, and who has much tartar on his teeth, will contain phosphate of lime and other salts, in an infinitely greater quantity than that of the other, which will contain more of gelatin.

In general, it is observed, that those people who live temperately, are also those whose state of health is the best, and in

* In all my dissections, I have always made the same observations, not only on the teeth, but also on all the osseous parts.

† In opening a dental matrix containing a crown of a tooth in formation, we may frequently find it wholly red, and the enamel, which is still tender, of such a color as to persuade us that it is embued with blood. On leaving it to dry, it becomes covered with small cracks, and as white as alabaster. This coloring fluid in the enamel of the teeth is, therefore, absorbed, since these bones, on shooting from the gums, are as white as marble. It is certain that those who deny that there is a circulation in the organs of which we are speaking, have not observed all the phenomena that pass there.

whom the teeth are primitively good. If among these are found individuals with bad teeth, the humid and cold places that they inhabit are the cause of them; but they decay only with slowness and little pain. The Egyptians and Israelites, whose customs are known to us, and some of whose mummies have come down to us, have excellent teeth, as Sprengle observes; because they joined to sobriety the advantage of inhabiting a country that was dry and free from fogs. But why go back so far, when we may see a similar circumstance under our eyes? The inhabitants of Savore, the Auvergnats, and all the hordes that live on rich food, and in elevated situations, and who, in short, exercise much of their physical strength, are sanguineous, and have, in general, very good teeth; whilst the inhabitants of the vallies of the same countries are lymphatic, and have very bad teeth.

Experience, therefore, shows that good teeth are found only in persons who are reared so as to become in good health, and who preserve the good disposition all the time that odontophia lasts. If these individuals have contracted any disease that has changed this happy state, they owe it to the abuse of the advantages with which they are favored, or to the unfortunate circumstances in which they have been placed.

The teeth are not immediately under the influence of the grand circulation. In the natural state,* the arterial blood does not come successively in their tissue, as it does in the other bones. This fluid penetrates to their centre, but having arrived there, it is poured into a ganglion-like body, which is an organ of a peculiar sort, whose functions are to act after its own manner, on the juices that are furnished it, and to extract from them the gelatin that forms the meshes of the tooth, and the terreous salts that give them consistence. This small body,

* I say *in the natural state*, because, in some injuries of the tissue of the teeth, the blood traverses the capillary tubes of the ganglion, without undergoing a change, and its red color penetrates even into the osseous substance. I have several times made my pupils notice this phenomenon, that is met with in the teeth whose crowns have been broken in an attempt to extract. If the ganglion has not been destroyed, it is inflamed, the blood passes into the meshes of the dental tissue, and forms there beautiful red rays or streaks.

that authors have named the pulp, is endowed with an exquisite sensibility, and, consequently, with a great vitality.

The teeth, therefore, are susceptible of changing their primitive state, either for good or evil, but with extreme slowness, since they can be considered only as parasitical beings, engrafted and living on animals whose blood nourishes them, but which assimilate it in a way proper to them, whilst they exist after their own manner. The circulation and sensation are isolated in the tooth; it is endowed with an organ peculiarly sensitive, and much more impressible than the small nervous branch that establishes its connections with the *ancephale;* thus the pain peculiar to the teeth is pain, *par excellence*, it can only be compared to itself.

Dental caries has characteristics that are peculiar to it; but it also has others that are common to it and the bones, and I am astonished that this affection has not engaged the attention of nosologists; for the crowns of the teeth not being surrounded with carious substances, whose ulceration may produce caries, this disease, considered in a general manner, may be there studied in its nudity; an advantage that no other bones present. Caries of the teeth is an affection of their tissue, and not a simple decomposition proper to inert bodies; as the ulcer of the soft parts is easily healed in a healthy man, so the curation of this injury is effected with ease in subjects of good constitutions. Caries cannot be of the same nature in individuals of different constitutions, because their teeth have not the same solidity. Thus, those which are very much charged with gelatin, will be exposed to odonto-malaxia, whilst those in which the calcareous phosphate is in a great proportion, will not be attacked with it, as long as they preserve this advantage. But absorption being effected in the teeth, as in other bones, (which their softening in the interior and below the enamel demonstrates,) consequently, it follows, unless some external agent may have had power to act on the osseous tissue, that we can estimate the qualities of the humors by the nature of the caries that is manifested in the teeth.

The softening of the interior tissue can arise only from a disturbance of the functions of the central ganglion; this disturb-

ance is the result of the arrival at this body, of arterial blood deprived of the qualities necessary to maintain it in a state of health. Thus we always observe that subjects who constitutionally have had good teeth, and in whom these bones, in consequence of diseases, a yellowish white become at first white blue, then are lost one after another, or all at once, may perish before the affection shows itself in the bones. This is precisely what happens to those who accidentally become consumptive, because, in this case, the caries being nothing but a consequence of the general weakness, the patient ordinarily dies before the central ganglion can arrive at that state in which all its properties are changed.*

But whatever may be the diseased state of the teeth, they may even be examined as unexceptionable testimony, that will inform us whether the patient owes his present state to a predisposition, or whether, having supervened during the course of his existence, it depends on an accidental cause. In this latter case, the physician may hope to ameliorate the condition of the subject, since it is only the result of a momentatry disturbance produced in the functions of the organs.

The child born of a debilitated parent, and, above all, suckled by her, will preserve more or less traces of it throughout the whole of his life. Good nutriment and great care are, it is true, excellent means to bring him to a better state; he may even become very corpulent; but his appearance will deceive only the vulgar. The inspection of his mouth will tell the physician that this subject was not born to be thus well constituted. The crowns of his teeth will be slender, a greater or less number of them will, at an early period, without any local cause, be attacked with caries, and their primitive color, that was bluish, although passed, in the course of time, to a bright yellow towards the gums, will always, at their cutting extremities, preserve something of its first shade; moreover, they are tender under the file, and very irritable.

Those whose teeth, although beautiful and with polished surfaces, present shades intermixed with a dirtier white, have

* This explains why certain consumptive persons die with fine teeth.

had alternations of good and indifferent health during the formation of the enamel. These teeth ordinarily have elongated crowns, and may present marks of congenital atrophy. Teeth of this kind deceive us by a false appearance of solidity; they remain sound until about the age of from fourteen to eighteen; then, at this period, a certain number of them decay, especially when the subject was lymphatic in infancy, continues to be so in adolescence. This description of teeth is frequently met with in the rich classes, whose children, born feeble, reach puberty only by means of great care, and, consequently, owe their existence only to the continued attention of their parents, and the tonic regimen that the physician has had them continually to follow. Having reached the eighteenth or twentieth year, their health is confirmed, but the mucous membranes always preserve a tendency to be affected; the amelioration is discovered in the redder color of their mouth, and particularly of the interior of the lips, and the roof of the palate: it shows itself by degrees, as the subject gradually advances in age. It is thus that mucous persons, having gained a sanguineous temperament, would deceive us, if some apparent marks of erosion on the triturating surfaces of the first permanent molars, did not inform us that the present constitution is the result of amelioration.

He that is of a temperament in which the mucous system predominates, always has the teeth disposed to a sort of external caries, whose physical characteristic is to be white, soft and very painful; as well as to a sort of erosion that removes the enamel in scales; it is this that led M. Duval to designate it by the name of decorticating.* But caries, being capable of being determined by external causes, independent of the primordial constitution, it is essential to know that this last ordinarily attacks only some of the teeth, and even of only one side of the mouth, while that which supervenes from predisposition corrupts, almost at the same time, all the parallel teeth to be developed when the subject was in a diseased state. Those which were ossified before, as well as those that have been formed since the return to a better state of health, are good. It is on this account that we

* Vide Dictionary of Medical Sciences, article Dent.

observe the series of the first permanent molars, or of the second, or of the bicuspides, are, in some children, attacked at an early period, although the other teeth are very sound.

In general, the more voluminous the teeth are, the more the proportion of the osseous substance exceeds the quantity of the enamel; and the slenderer this covering is, the more facility caries has to develope itself on the teeth; thus, it is more frequent in the small depressions that are seen on the surfaces of the molars, than on the cutting edges of the anterior teeth, and is more ordinarily observed on the lateral faces than on their surfaces. It is, indeed, in these points that the enamel has the least thickness, and, consequently, it is here that an osseous ulcer, arising from an internal cause, has the greatest facility to expand.

Caries can be healed by the efforts of nature alone, only when the constitution of the subject is good, or when, having formerly been so, it returns, after having been accidentally deteriorated, to its primitive state. When the soft, osseous portion dies and exfoliates, and the cicatrix forms a brown, polished layer. The tooth, although having lost much of its substance, ceases to be painful, regains its hardness, and may exist for life, unless a new disease attacks it.

To recapitulate: with a good constitution, men always have good teeth; if it deteriorates during the course of existence, the teeth gradually turn blue, and caries attacks them; still, as they preserve their original form, and, moreover, for a long time resist the sort of general decomposition that has destroyed the subject, we can discern, even after his death, what was his primordial state.

The teeth that were tender, and of which a certain number had been destroyed, in him whose primitive constitution was mucous, gradually assume more consistence as he approaches a sanguineous temperament, and, instead of being bluish, they take on a grey tint. The caries remains stationary, and the subject, who, for a greater or less length of time, has been tormented by odontalgia, slight indispositions, bad digestion, rheums, &c., no longer suffers from them. His lips and gums, that were pale, become redder; and his saliva is less abundant

in mucilage; the blood is charged with coloring particles. These happy changes are especially observed to take place in females.

Finally, in women of this temperament, the teeth are impaired during gestation and lactation. These two functions always momentarily debilitate the strongest; because the infant absorbs a great quantity of the nutritive substance, of which a mother, already delicate, cannot be deprived, unless with detriment to her own proper person. Those persons who had better not suckle, unless when peculiar circumstances compel them to it, have need to be supported with good wine, and very substantial aliments.

Although the teeth are very compact, yet they are, for several reasons, more susceptible to diseases than all our other osseous parts. In the first place, they alone, and that for several years, are in contact with the product of a mucous membrane; consequently, they are subject to undergo some change, when it is affected. In the second place, not being covered with flesh, they receive different sorts of impressions, that may be the more hurtful to them, as the part of the enamel, which was formed during the time of our indisposition, has not all the solidity that is desirable for it to possess. On the other hand, since this also is a very hard body, and one whose vitality is very obscure, the least disturbance in the mode of nutriment that is peculiar to it, occasions injuries more or less severe, according as the tissue is more or less delicate. The traces, therefore, of the great change it has experienced, remain for life, and the congenital affections that happened while the teeth were at different degrees of ossification, may serve to indicate the age at which the subject was diseased.

But in studying the diseases to which children are the most disposed, we find that those which affect the mucous membranes hold the first rank: now, ought the physician, whose judgment should never be uncertain, who does not forget to question the patient that he sees for the first time, and thus inform himself of the temperament of the subject—neglect to examine the teeth, where is found, written in indelible characters, the kind of affection to which the subject was disposed in his childhood,

and which must always, or at least for a very long time, have a great tendency to appear again?

Nevertheless, this is not because that some superficial injuries of the enamel are not susceptible of disappearing in length of time; but these are light, for, if the disease that produces them is ever so little prolonged, or renewed at several returns, the child but slowly recovers, the adult teeth present defects of enamelling, affecting them in transverse lines, of greater or lesser depth, whose number is in proportion to the relapses. On this point, I refer to what I have already said of erosion and atrophy.

Thus, therefore, the superficial marks on the enamel, or the deep ones in the tissue of the teeth, indicate only that the subject has been annoyed with an inflammation of the mucous membranes, and are not, as M. Laforgue, in his semeology, advances, unequivocal signs of a scorbutic affection.

As to caries arising from a debilitated organization of the teeth, it has characteristics that distinguish it, and do not suffer it to be confounded with that which is but the result of accidental and external injuries. The physician, therefore, may obtain valuable indications from the diseases of the teeth, in acquiring a knowledge both of the constitution of the subject, and the treatment which is suitable to each kind.

I know a lady of thirty, who, ten years ago, was of a fine constitution; her teeth were of an excellent quality, her gums fresh, and the small arterial vessels of the lips of a beautiful color. A painful delivery occasioned great disturbance in the economy; the matrix remained diseased. Then there was great paleness of the gums and lips, on which soon but a few red vessels were perceived; the saliva was very stringy. One day, without the advice of a physician, she applied leeches; the blood was very pale and serous. The general debility was necessarily found to be increased. Soon the teeth felt the want of sanguification; they were spotted in different places; caries was developed, and all local endeavors to restrain it were, for a long time, ineffectual; they rotted below the enamel, occasioning dull pains, and the caries presented a large excavation; a part of the osseous centre of each tooth was softened, its calcareous phosphate having been absorbed. Four were in a short time destroyed; but finally,

nature seconding the efforts of the physician, her health was restored. A year ago she became better, and the organs contained in the mouth participate in the change. Already the vessels of the mucous membranes of the mouth are seen in greater numbers; the blood has not that paleness which denotes weakness; the saliva is less charged with mucilage, and the caries of the teeth, ceasing to be painful, assumes a brown tint, which announces that it is healed. The stomach and intestines now perform their functions without pain. Finally, thanks to the good constitution born with this lady, there is every reason to hope that she will escape from an affection to which many others would have been victims in spite of all the efforts of art.

It is thus only, after having collected a certain number of facts, and compared them with one another, after having followed the phenomena of their progress, and seen in what they are like those which pass in the teeth, that I have been bold to suppose that the softening of the bone which occasions a torsion of the vertebral column, in some very mucous children, may sometimes depend on an increased action of the absorbents; but that it results, most frequently, from a penury of the terreous salts furnished by the arterial system, of which the exhalents do not deposite a sufficient quantity in the bones. Hence it is that every thing which favors a good sanguification arrests the progress of *osteo-malaxia*, such as a tonic nutriment, good wine, &c. Besides, all the children that are constitutionally in this case, have the blood very little colored, the teeth are of a beautiful white, and very easily decay.

It is, therefore, essential to distinguish the *original constitution* from what is called *temperament*.

There are only some primordial dispositions that are easy to be distinguished, whilst the temperaments present not many shades, that authors are much embarrassed in classifying them; the innate constitution may remain the same, then the temperament results from predisposition. But when this changes during life, there results an acquired temperament; still there will not the less remain certain indices of the primitive state.

The temperament which will be the product of physical education, may vary to such a degree as not to be the same this

year as it was another, and vice versa. I mean, therefore, by good constitution, a happy state of health by predisposition; and good temperament, the present perfect state, whether the primitive constitution has been favorable, indifferent, or even bad. If this distinction may be useful in practice, *the semeology of the mouth has alone led to it.*

There are mixed temperaments, which it will be impossible to classify, if recourse is not had to the inspection of the mouth. The persons in whom they are found do not complain of any sort of habitual indisposition; thus, all the questions that are put them by the physician do not turn to his instruction, but even sometimes perplex him. He cannot know too well how to study each indication separately, in order that those which are least variable may form his prognosis. The knowledge which we may have of the primordial state, leads to the discovery of the temperament. Such and such constitutions are more easily changed than others. But whatever confidence I may have in the indications that are observed in the mouth, to form the prognosis, I think that, in many doubtful cases, it can only result from the collection of many others, studied on different organs; consequently, all the isolated *semeographies*, either of the mouth, eyes or face, will always be imperfect, and can only be considered as fragments whose reunion will alone form a good general semeology. It will not, therefore, seem strange if I make a few remarks on those things that I have observed on other parts, and which contribute to form the special characteristics of the constitutions of which I have just spoken.

Mr. Spurzheim,* with justness, observes, that authors of our day still propagate some errors on the subject of temperament, which, say they, influence the moral qualities of animals, and especially of man. It seems to me, that this comes from writers not distinguishing the temperament from the constitution; for the latter is necessarily connected with the inclinations.

This is not the case with the temperament, which, being, in most persons living in society, nothing more than the result of their daily occupations, may change the corporeal dispositions,

* Phrenology, p. 16, &c., 1818.

without, in a remarkable degree, influencing the qualities of the mind. I here wholly except cases of disease. Thus, therefore, the physician may still derive advantage from the moral study of the individual, in discerning his original constitution.

There is no doubt that the ancient nations, such as the Spartans, the Celts, were endowed with good temperaments, because the state of health of the father was transmitted to his children, and this precious heritage was maintained by strengthening exercises and a salubrious diet. The constitutions of these men gradually became to be almost the same. Their diseases varied but little, and were very rare; thus, medicine among the ancients appears to have been occupied with but little more than the treatment of the epidermis, and surgery was confined to the dressing of the wounds of those who had been injured in war. But time having changed the habits of people, luxury on the one side, and wretchedness on the other, having taken the place of competency of the whole, the multiplicity of constitutions has been the work of civilized life;* so that we may at present distinguish five, viz. the *perfect*, the *sanguineous*, the *bilious*, the *mucous* and the *serous*.

The indications of the most perfect innate constitution, taken in a subject of from about three years until five and twenty, are the following: red lips, tending to a violet color, and approaching the shade of that flower which is called *hortensia*.† They are slender and dry, the tongue and gums are a little paler, as well as rough and firm, not furnishing any tartar, or, if any is found, it is scarce, black and dry, and very adhesive to the teeth; the whole of the mucous membrane that covers the different parts and the back of the mouth, is of a lively color; the saliva is frothy, the arch of the palate well formed, the crowns of the teeth, whether of the first or second dentition, are short and of a medium size; consequently are well arranged, thick, of a dull white color, with an enamel remaining firm under the scraper; the eye is soft, and with a certain expression of liveli-

* Vide the treatise on *physical education*, by Louis Sinibaldi, translated from the Italian, by M. Bonpart, M. D., 1818.

† Laforgue, Semeology of the Mouth.

ness, the skin of the face is not very white, but the cheeks are slightly colored.

If in old age the subject is kept in his natural state of health, all the parts of the mouth are of a deeper color, his teeth become a little yellow, do not decay, remain firm in their alveoli, and are frequently worn even to the level of the gums.

It is thus that the *athletics* are constituted, who are in general but little exposed to diseases, unless some specific cause acts against them.

As the individuals provided with this good disposition, enjoy all the plenitude of health, they are very much disposed to abuse the things that are agreeable to them; thus, those who live freely, towards their old age, because sanguineous or bilious, and often the gout and gravel attack them, even before they have reached it. Their stomachs and their genital organs frequently suffer from their intemperance.

Their teeth scarcely ever decay, except by a sort of external caries, that is called *dry*, which is very slow in its progress, and is, as I have said before, frequently determined by the pressure of the bones one against another, which with facility heals of itself.

If subjects that are thus endowed with an excellent constitution experience any destructive malady during their youth, their temperament becomes slightly mucous, which is perceived from the state of the saliva, and the paleness of the gums and lips. The blood seen through the small arteries of the mouth appears less lively.

After this constitution another is immediately found, whose characteristics are as follows: the tongue and lips are thick, more colored and visibly humid; the edges are sensibly turned outward. The other parts of the mouth, that the mucous membrane lines, are also very animated; the teeth are good, very strong, a little susceptible to caries, and frequently of a very remarkable size; they are longer than those of the preceding constitution, and in youth they incline to an azure color, having the reflection of mother of pearl, then to a dull white. Until the twenty-fifth or thirtieth year, the gums furnish but little of tartar, and this is brown or dry; the saliva is very much charged with oxygen, the eye is lively and moist.

In more aged individuals, the color of the blood is still more decided in the mouth, and principally in the lips, which frequently are very thick; the gums become sensible, then they produce tartar, are detached from the teeth, and bleed with facility, the blood is cherry-red, and the face is ordinarily very much colored.

In these subjects, the osseous system appears to assume a peculiar development; it is among them that we frequently find the maxillary bones salient, and the teeth jutting out, strong in the crowns, with roots of an extraordinary length, whose central canal is frequently, at an early period, obstructed by the ossification of the whole of the ganglion.

The calcareous phosphate is, therefore, in their blood, in a great proportion; the same is the case with the coloring principle; thus the majority of the acute and chronic diseases that attack them are of an inflammatory nature. The most delicate capillary vessels, which are only red and scarcely visible in subjects of the preceding constitution, are very red and very full in these. They are also subject to apoplexy, and to chronic inflammations of the parenchymatous organs, such as the liver. This constitution is sometimes so decided that the lips are violet; then it has been very improperly called *scorbutic*; since I have demonstrated from experience, that individuals in whom this disposition is observed, although exposed to scorbutic contagion, did not contract it.

Many of those subjects are found in mountainous countries, and among people of elevated districts; the fevers called complicated, and active obstructions of the sanguineous capillaries of the viscera are especially found among them. Ricketty persons very frequently have also a constitution of this nature.*

In deteriorating, it approaches the mucous or serous disposition; in this latter case, the lips are of a red fawn color on their edges, the gums *marbled*, and their festoons flabby and of a violet hue.

The sanguineous constitution may be mixed with the next

* This is one of the reasons that lead me to say that the rickets and *osteomalaxia* appear to me to be quite distinct diseases.

in order; then the teeth are short, of a bluish white on their cutting extremities, whilst they incline to a yellow towards the gums; they furnish more tartar, which is dry and yellow. If these subjects abuse their physical powers, by committing excess in regimen, or if they devote themselves too much to study, they are weakened more and more, are subject to chronic sanguineous obstructions of the capillaries of the lungs, and then to passive hæmorrhages. The caries that attacks is the result of an inflammation of the central ganglion. The alveolo-dental periosteum is also very susceptible of acute or chronic affections.

All the indications in which the liver appears to exercise a certain influence in health, are distinguishable by the simple inspection of the mouth; the tongue and the edges of the lips are red in persons that hold the mean between the perfect constitution and the sanguineous; but they have a yellowish hue that makes itself perceptible, especially on the inside of the lower lip, and is also observed on the arch of the palate. The tongues of these persons are habitually covered with a slight yellowish layer; the tartar is more abundant than in the preceding dispositions; it is of a citron color, not very consistent, but the more so as this constitution is the more decided. The blood contains a very yellow serosity, and the vessels in the mouth are not very visible. The teeth of these subjects are short in some, but they are the most frequently a little long; in all the cases they are strong and of a pale color; they are lost by the abundance of tartar that separates them from the gums; they are but a little exposed to caries, and that which attacks them makes but slow progress. The eye is lively, having a yellow hue, it seems restless; the skin is yellowish.

The diseases that most ordinarily attack these persons, are acute inflammations of the digestive passages, or of the lungs, spleen or liver. This constitution is not easy to be distinguished, and the indications which characterise it in the mouth, most frequently are not decided until about the age of puberty; so that we may consider it only as a modification of one of the preceding constitutions, and consequently only as a temperament. Besides, it is very frequently combined with the disposition about to follow; then the character and consistence of the

teeth, and of other parts of the mouth, are mixed; the teeth are white, and affections of the lungs are more frequent, in these individuals, than those of the stomach and intestines.

The ancients have called *pituitous*, and the moderns *mucous*, a *predisposition* that is very frequently met with in vallies and humid countries. It is remarkable for the irritability of all the mucous membranes, which consequently enjoy an extreme vitality, and exhale a great quantity of fluid.

The beautiful arch of the palate, which is always found in the perfect constitution, is more rare in this; it frequently is not much developed, which, in a number of subjects, causes the teeth, although of an ordinary size, to be badly arranged. These small bones frequently present marks of erosion or congenital atrophy; they are very impressible, so that caries soon attacks them; it is white, soft, and makes rapid progress. Sometimes there is a veritable, partial softening of the teeth. In children, the skin is ordinarily white and tender; nevertheless, we also see it brown and wrinkled. They are generally weak and delicate, their blood is pale, the nutrition is performed with indifference; the vertebral column of females is very much disposed to curve at the period of puberty, because a great part of the vital energies being then directed towards the uterus, it would seem that they languish in the osseous system, to which they are so very necessary.

Indeed, a number of observations that I have collected during my practice in the city, and in several public establishments, have strengthened me in the opinion that it is in this constitution especially, that the children of whom I have just spoken are found. In them the *organic life* has so little energy, that if a local cause happens to operate on a certain point, with more activity than it has hitherto done, the assimilating force of almost all the others sensibly diminishes. It is likewise probable that the ganglion-obstructions, that are developed in a great number, during odontophia, are owing to the diminution of the sensibility in the lymphatics.

We may also remark, that their skin being ordinarily very impressible, the sympathy established between it and the mucous membranes, renders these individuals liable to contract

rheums, gastric and intestinal affections; they are also subject to easy and nocturnal sweats, to worms, to vomitings of a sero-mucous fluid, &c.

This disposition is ameliorated, when the blood, by assuming color, establishes a mucous sanguineous temperament; but if, from before the birth, it is combined with that disposition that we call *lymphatic*, it will establish a mixed constitution, that will partake of the nature of both. In this latter case, the teeth may be affected with erosion and atrophy. Those of the second set will alone be so, if the combination has only occurred in the second or third year of life; finally, neither of them will be affected, and they may even be very pretty, if the combination has taken place only after the seventh year.

The affections of the lungs are frequent, and may appear very early, in persons of this constitution, or of its compounds. Their teeth, that were before of a remarkable white, assume by degrees, an azure color; they are very tender under the file, are easily set on edge; but, nevertheless, they never decay.

It is from the want of having observed the characteristics that may distinguish these predispositions, that *Blumenbach* has denied that the color of the teeth can indicate whether the subject is disposed to consumption. It may indicate it, if the other signs of the constitution, which I have just described, are joined to it; this is a point to which Camper also has not paid attention.

A species of constitution, that has not much analogy with the preceding, when it is degenerated, is distinguished by the symptoms I am about to mention; the gums are sensibly pale and glossy, the tongue very smooth, the teeth small, with short roots, well arranged, of a greyish white color, surrounded at their necks with tartar superficially very mucous, whilst the lower layer of it is very consistent; abundant saliva, stringy as albumen, and which, these persons say, seems to them to be of a salt or acidulated taste. The membrane of the mouth easily contracts aphthous affections; the lips are pale on the side that touches the teeth, whilst they are red, and, as it were, stiff on their free edges, where cracks are frequently found. Add to these indications, taken only from the mouth, those of the rest of the body; the skin is warm, the face, though not very large, is swelled, the

environs of the eyes are infiltrated, the glance is languid. If this bad condition of the subject is not ameliorated, he rarely reaches puberty; but in case he does reach it, he will have varixes of the legs, or spots of suffused blood. In this constitution, serosity abounds in the blood to such a degree, that it seems to be deprived of coloring matter. The ancients called those who presented such a constitution, *lymphatic;* but it is more frequently an acquired temperament; infiltrations, serous suffusions, osteomalaxia from the birth, are the sad portion of these subjects.

The best thing that can happen to these persons is, that in ameliorating the state of their health by a good regimen, they will acquire a temperament that approaches to the sanguineous or mucous, of which I have before spoken.

Such are the *mother* constitutions that I have observed, and whose principal traits I have studied at every moment I was able; but they are well determined only on a small number of subjects, for it is with them as it is with the physiognomy, every individual has his own, not exactly resembling any other. Each of these predispositions is, therefore, susceptible of being, in some sort, mixed with one or two others, whence there result compounds, that form, nevertheless, idiosyncrasies; still, whatever may be the combinations, there always exist in the mouth certain marks that make known the predominant disposition; but as it does not always happen that they are very visible, it is not essential to rely exclusively on signs taken separately from any organs; for the organs themselves, as well as the constitutions, being susceptible of experiencing changes, either for good or bad, it is necessary to direct the attention to every thing that can offer indications of them. Nevertheless, he that will diligently apply himself to the semeology of the mouth, and add his own observations to what I have already said, will find that the teeth, whether a person has acquired a good temperament during his growth, or whether, on the contrary, the constitution, primitively good, has deteriorated, are the only organs in which the physician may hope to meet with traces of the original disposition.

The following remarks will give examples of the incontestible advantage presented by that part of semeology, the principal characteristics of which I have just traced.

A lady, of a good constitution, and forty-five years old, was attacked with cardialgia, and, a little while after, she each day threw up a portion of her food. As she grew very meagre, she consulted skilful physicians, who, suspecting a chronic inflammation of the stomach, ordered various medicines; but they brought no alleviation of her distresses. She therefore took it into her head no longer to employ professional men, but to use opium. In a little while the pain in the stomach disappeared, yet the vomiting continued to occur daily; four years were thus passed, during which the patient recovered her former plumpness. Having, on a warm day, drank a glass of ice water, she was seized with a gastric fever and died. I assisted at the opening of the body; the stomach presented marks of old inflammation, or of serosity.

I had had occasion to examine the mouth of this lady several times during the course of her affection, and I observed that the saliva was not mucous, that her lips had become pale only in consequence of the bleeding and antiphlogistic treatment which had been recommended to her; but I never observed that red edge which is seen in persons attacked by inflammation of the pylorus or of the cardia. Consequently, I suspected that the disease consisted in an injury of the nervous sensibility of the stomach; the examination confirmed this opinion.

I have likewise had occasion to make the same observation on a man, who, during twenty years, threw up a part of his food, and died of a dreadful apoplexy at the age of seventy-one; ocular examination presented no signs of injury in the alimentary tube.

A person who has honored me with some affection, and whose health strongly interests me, has, for fifteen years, thrown up her food every night, and is not at all disquieted by this situation, which is rather disagreeable than hurtful, for she is otherwise in good health, and the state of her mouth presents no signs of organic disease.

I also know a lady, who for a long time has had a cough that might be attributed to a chronic inflammation of the breast; but as the saliva is not mucous, and the mouth of a beautiful *hortensia* rose, and as she is otherwise in good health, I think that

the breast is only nervous; because I have observed that when the lungs are affected by a mucous fluxion, acute or chronic, the mouth announces the injury of that organ, by a saliva more stringy than it was when the subject was in health.

The state of the mouth is capable of changing not only with slowness, but also sometimes with rapidity. I have seen white or red obstructions of the gums, scarceness or abundance of tartar, &c., occur all at once, and be forerunners of an affection of some interior organ, such as the lungs, the stomach, the liver, &c.

Besides, this remark has been made long before, by Bourdet, surgeon dentist to Louis XV, and there is a well known anecdote, that does honor to this practitioner.

The king was in the habit of having his mouth examined once every month. One day, Bourdet observed changes that surprised him; he immediately hastened to inform the chief physician of them, who did not at all regard the advice; the monarch, however, became grievously ill, which it might have been possible to prevent, had it been taken in time.

Before concluding these observations on semeology, I will also call the attention of physicians to very different injuries of the mucous membranes of the mouth; which have been confounded under the generic denomination of *fluxions;* but which are not even described by nosographers, although they are very frequent, and a coup d'œil directed to them would have been able to throw some light on certain affections that probably have much analogy with them. This omission is to the injury of the art, since, of all the diseases ranged under the order of inflammations of mucous membranes, those of the mouth are the only ones whose development our eyes have the power to follow, and whose study, consequently, may serve as a term of comparison, in establishing the progress of those which are manifested either in the stomach, intestines or lungs, and other places where our view cannot penetrate. Nevertheless, wishing to confine myself within the circle I have marked out for myself, I only make this reflection here for the benefit of the science, it is for them who apply themselves to all that constitutes it, to be assured whether the affections of the mucous membranes that

line the other cavities, are really of the same nature with those of the mouth ; for then the system of irritation and inflammation, which is now established, would, in consequence, have to undergo important modifications, when they are considered in the mucous membranes; because we should be obliged to recognize two sorts of them, in place of one capable of having different degrees; as also Dr. Broussais has shown, who, moreover, has demonstrated that the inflammations differ in physical appearances and pathological characteristics, according to the nature of the tissue in which they are examined.

I will, therefore, from observation, describe the two sorts of stomatic fluxions that I have frequently met with in practice. The one is red ; it has its seat in the capillary extremities of the sanguineous vessels of some portions of the mucous membrane, or of the adjacent parts ; I designate it by the name of *buccalite*. The other is white, and has its seat in the glandulous crypts of the mucous membrane, which is frequently substituted for it ; the English are in the habit even of placing them on the gums. When the patient feels no repugnance, I employ this means, from which I have derived manifest advantage ; or I content myself with making some punctures with a lancet. The thirst is appeased by lemonade, which, at the same time, serves as a gargle. When the gastric symptoms are perceived, and we see a little abatement, which happens towards the third day, it is good to excite vomiting ; thenceforth the patient progresses towards convalescence, and we may determine the local resolution, by having the gums rubbed with a brush and acidulated water.

Resolution is, therefore, the most ordinary termination of *buccalite*. Still I have several times seen great and critical abscesses formed on the gums and tonsils. If we cause vomiting at the commencement of the disease, instead of deriving advantage from it, the inflammation will be increased. This sort of inflammation is ordinarily found in persons of a good temperament, or in those who are called sanguineous and bilious. It does not always attack the stomatic membrane ; it may establish its seats in the environs; thus, it is sometimes seated only in the teguments of the lips or cheeks ; then these parts are

much swollen, very red, and hot; the eyelids infiltrated and sensible to the touch; the eyes restless, the pulse strong, the tongue red; the gums sound, as well as the interior of the lips, whose free edge alone are of a remarkable redness. The seat of the disease is, therefore, in the capillary extremities of the exhalents, while the sanguineous vessels even of a very small calibre, are not affected.

Second Species, Buccalée.—This has its special seat in the white capillaries of the stomatic mucous membrane, or of the cellular tissue of the face. The extremities of the nerves especially, appear to be much affected.

Causes.—They may be the same as those which occasion the preceding inflammation; but this is especially observed in persons whose blood is very serous and but little colored, and who, besides, are nervous. In this case, there is a predisposition to it; yet there are three specific causes that may produce it, whatever may be the idiosyncrasy of the subject. 1st. Inconsiderate use of mercurial medicines; 2d. Obturation of a tooth attacked by sanious caries; 3d. The perforation of a root to place on it an artificial tooth. In these last cases, especially, the nervous system is immediately irritated.

Symptoms.—Violent tension of the gums, which are very sensible, swollen, smooth, and as if infiltrated with serosity; paler than in the ordinary state; the teeth are charged with a whitish and soft tartar. Great pain, acute in the cheeks, recurring at intervals, and resembling the pricks of a needle; face and lips stiff, sensible without remarkable redness; stomatic heat a little sensibly increased, *no thirst*, saliva very mucous, and at times so abundant that the patient lets it drop from the mouth; if a piece of silver is placed in it, or if it is spit into a basin of this metal, some places become black; *tongue white*, no bad taste, sometimes an appetite, at other times none; pulse frequent, hard. This affection, in general, is more painful than the preceding.

Such are the symptoms that *buccalée* presents from its commencement. They are continued until its termination, increasing in intensity for two or three days; then the resolution is effected, and is not entirely completed until about the ninth or

tenth day. Abscesses of the gums are also, in this fluxion, very frequently formed, without the patient having experienced any sensation of arterial pulsation, or inconvenient heat. I have seen very large abscesses of this sort disappear of themselves.

Treatment.—If the efficient cause is one of those which I have enumerated in treating of the preceding affection, an emetic given in the beginning will cause the fluxion suddenly to fall, ordinarily purgatives administered in the first stages of the disease make it abortive, or abridge its course. A blister applied on the nape of the neck, or behind the ears, diminishes the irritation of the mouth, and facilitates the resolution, which is always the slowest as the subject is the more serous. The convalescence is, in general, longer than in the preceding case. The soft parts of the mouth frequently preserve, for a very long time, an atonic clamminess, which can only be dissipated by the internal employment of oxyd of iron, bitters, and even quinine, especially when some slight paroxysms of intermittent fever are perceived; I have several times seen it succeed in this affection, with delicate persons. Although the gums are swollen, sometimes even a little rosy, it is necessary to guard against pricking them; for there being a very violent tension of their fibres, the local pain is increased; moreover, scarcely any blood oozes forth. If we apply leeches, the infiltration of the part is increased, and the progress is, in consequence, retarded.

Mucilaginous persons should use gargarisms, such as milk, the decoction of figs, to which we may add a little of the tincture of opium. They may anoint the face and lips with the oil of olives, as the irritation continues, and the acute pains are felt. Then we may aid the secretion with external lotions, with refined water of aromatic vinegar, or even with spirituous liquids, as cologne water, etc. Finally, the absorbing powders of magnesia, of carbonate of lime, are very usefully employed on the third day of the attack; they may be rubbed on the gums with a small brush or sponge, or they may be taken internally; but it is necessary to open the abscess at a very early period.

At times, one or the other of the fluxions is manifested simply on the face, without the mouth's appearing to be the seat of any, even consecutive, irritation. I have met with cases of this kind, in persons who had an obstruction of the maxillary sinus.

In certain subjects, the two sorts of diseases are, in some way, complicated; the swelling of the gums, instead of being red or white, is very rosy.

These affections may pass to the chronic state, especially the sanguineous inflammation; then the gums, which, until the attack, were firm, and of an agreeable color, do not return to their first state; they remain swollen and red. They furnished no tartar before the disease; but from that moment they begin to produce a greater or less quantity of it, in proportion to the persistent obstruction; it is white or soft, according to the temperament of the subject; yet the mucous part of the saliva is not sensibly increased.

In the second sort, the stomatic membrane likewise remains swollen, but the gums are soft, white, or present a small fillet of lively red around their festoons. From that time there is an increase of habitual mucous exhalations, the saliva is stringy, there is collected around the necks of the teeth, a soft, white tartar, which is more or less abundant, and assumes consistency only with time.

When, before attaching myself exclusively to the study of the diseases of the mouth, I practiced the various branches of medicine, I often derived advantage from the knowledge of the above two affections, so different in their progress and effects, as well as in the mode of treatment that is suitable to each; for when, in an attack of disease of the stomach or lungs, I met with a series of symptoms that belonged to one of them, I thence concluded that an affection like it was developed in one of their viscera, and I opposed it with means that I successfully employed to combat that affection with which I supposed it analogous. This very simple practice constantly ensured me success.

Finally, I will conclude by observing that a great number of the accounts of supposed inflammations reported by Stott,

Boerhaave, Bordell, Leucadon, Pinel, Broussais, and a multitude of other excellent observers, present characteristics singularly resembling those which distinguish each sort of these stomatic fluxions, and that the only treatment that has succeeded in the different diseases of which they make mention, is precisely the same as that which it is necessary to employ to combat either one or other of the affections that I have described.

INDEX.

A.

B.

C.

D.

E.

F.

G.

O.

P.

S.

T.