CHAPTER XII.

THE EIGHTEENTH CENTURY.

ALTHOUGH there have been, even from the most remote times, individuals who have dedicated themselves exclusively to the cure of dental maladies, or to repairing the losses of the dental system by artificial means, and notwithstanding the progress gradually accomplished in this branch of the medical art, which progress was especially remarkable during the sixteenth and seventeenth centuries, it is not to be denied that, up to the beginning of the eighteenth century, dentistry was, in great part, considered one with medicine and surgery in general. It is but natural that dental art (and the same may be said of every special branch of medicine) could not assume a real individuality until it had attained to the higher grades of its development. As a matter of fact, dentistry, toward the end of the seventeenth century, was already a true specialty, although it counted but few worthy representatives at that time. The definite separation between the science and art of dentistry and general medicine and surgery, although it may have been retarded, could not fail to take place; and this, as we shall presently see, was effected by the celebrated French dentist Pierre Fauchard.

But, to remain faithful to chronological order, we will first speak briefly of some other writers.

LUDWIG CRON, a barber of Leipsic, in a pamphlet published in 1717, with the title *The barber's apprentice versed in bleeding and tooth pulling*,[1] declares, in a still more emphatic and general way than De Lavauguyon, that it is useless to detach the gum before proceeding to extract a tooth. This barber, strong in his own experience, dares to assert absolutely useless this ancient practice, advised first by Cornelius Celsus, and recommended after him, and in homage to his authority, by many other writers. It is, therefore, possible that even previous to Cron and De Lavauguyon many operators had dispensed with the practice recommended by Celsus, although this had become an accepted canon of the high medical profession.

LORENZ HEISTER (1683 to 1758), of Frankfort-am-Main, one of the most celebrated surgeons of the eighteenth century, wrote a dissertation on toothache,[2] treating besides very extensively of dental affections and

[1] Der beym aderlassen und Zahn-ausziehen Geschickten Barbiergesell, Leipsic, 1717.

[2] De dentium dolore, Altdorf, 1711.

their cure in a masterly work on surgery, published for the first time in 1718, and which went through numerous editions in various languages.

When the caries of a tooth is superficial, Heister advises the removal of the decayed part with the file; or, when the caries is deep down, the cavity ought first to be well cleaned with a toothpick or other like instrument, then filled with heated white wax, or mastic, the stopping being renewed as often as may be necessary. When a molar tooth is decayed, especially in the centre, the best way, says Heister, is to fill it with gold or lead leaf, or with a piece of the latter fitting into the cavity. If the carious cavity of a painful molar cannot be cleaned as it ought to be, the dropping of a little oil of cloves or of cinnamon or of guaiacum into it will be found useful, or even a few drops of spirit of vitriol; for in this manner one obtains at the same time the double advantage of destroying the impurities contained in the carious cavity and of soothing the pain. But if by chance the pain should persist, recourse must be had to the cauterizing iron, or to extraction. Sometimes, however, even the most violent toothache can be made to cease, either by scarifying the gums (a method already recommended by Pliny), by cauterizing the antitragus, or by pressing the aching tooth hard between the fingers, as Schelhammer[1] and some other writers had advised.

Heister writes at length on the extraction of teeth, on the indications and counterindications appertaining thereto, on the instruments with which the operation should be carried out, and so on. Regarding the position of the patients, he thinks it best to place them on a low seat or on the ground, if the tooth to be extracted is situated in the lower jaw, but if an upper tooth is to be extracted, patients should be placed on a chair or on a bed.

Movable prosthetic pieces are mentioned for the first time by this author. Although he is very concise in his manner of speaking of artificial teeth (this indicating that dental prosthesis was considered outside the sphere of action of the general surgeon), we nevertheless learn from him that partial sets of teeth made of ivory or hippopotamus tusks, and without special appliances for fixing them, were then in use, which, when applied in the void between the neighboring teeth, were maintained in position simply by their form. The author advises keeping prosthetic pieces very clean, removing them every evening before going to bed, and not putting them back in the mouth until they have been well cleaned.

Heister also speaks of nasal prosthesis; this was then carried out by applying noses made of wood or of silver, properly painted. In cases of

[1] Schelhammer wrote a dissertation "on the cure of toothache by touch," *De odontalgia tactu sananda*, Kiel, 1701. In the same year and in the same city, another pamphlet, by B. Krysingius, was written on the same subject. (See Crowley, Dental Bibliography, p. 13.)

trismus, this author altogether rejects the forcible opening of the jaws by means of screw dilators and such like instruments, as they act too violently, and, according to him, only aggravate the morbid condition. Even the extraction of a tooth is useless in such cases, as the patient can always absorb a certain quantity of liquid food through the closed teeth. On the other hand, the author expresses himself in favor of the incision of the gums in cases of difficult dentition. According to him, convulsions and the other nervous symptoms which children are subject to during the period of dentition depend wholly on the hardness and strained condition of the gum. It is, therefore, natural that the symptoms should disappear when an incision of the gums, reaching to the tooth that is coming through, has caused the tension to cease.

The author speaks very particularly of the treatment of epulis and parulis; but his views on this subject contain nothing of great importance.

René Jacques Croissant de Garengeot (1688 to 1759), the celebrated French surgeon, speaks very little of dental surgery in his works. He declares himself averse to the carrying out of too many operations on the teeth, and especially disapproves the use of the file, because, according to him, it ruins the enamel.[1] For a long time, especially in France, Garengeot was believed to have been the inventor of the key known by his name; but he merely perfected this instrument. In fact, through a later author, Lecluse, it clearly results that the key existed before Garengeot. "For extracting," writes Lecluse, "one may make use of the pelican that Garengeot has constructed on the English key." In a note, he afterward adds, "that the English key is an instrument used by dentists in England." However, it is not in the least certain that the key is really an instrument of English origin.

Loder, who wrote at the end of the eighteenth century, informs us that the so-called English key was called the German key in England; it is, therefore, not improbable, that this instrument, as some maintain, had its origin in Germany.[2]

Johann Junker (1679 to 1759), professor of medicine at the University of Halle, wrote on dental maladies, not only in a treatise on surgery, published in 1721, but also in three dissertations which were published some time later, and were entitled respectively: *De affectibus dentium* (1740), *De dentitione difficili* (1745), *De odontalgia* (1746). The author, however, for the most part, only repeats things already known; his writings have, therefore, little or no importance for us. He counsels the Cowper-Drake operation in treating the affections of Highmore's antrum; in carrying out the operation, however, he thinks the extraction of the second molar

[1] Sprengel, op. cit., vol. ii, p. 311.

[2] Joseph Linderer, Handbuch der Zahnheilkunde, vol. ii, p. 129.

to be preferable to that of the first. To prevent the formation of tartar on the teeth, he advises assiduous care in keeping the mouth clean, and recommends, among other things, rubbing the teeth with sage. He disapproves having recourse too readily to metal instruments to remove tartar from the teeth, because, according to him, it favors the production of dental caries. He holds it dangerous to extract the upper or lower canines when they are not loose, as, by reason of the depth of their roots an injury to the surrounding nerves may be the result, which not only might cause great pain, but in the case of the upper canines might lead to inflammation of the eye, and even of the dura mater!

When the caries is incipient, Junker advises rubbing the teeth several times a day for some time with common salt, in order that this should penetrate into their structure.[1]

Guillaume Maquest de la Motte (1655 to 1737), a distinguished French surgeon and the writer of an excellent treatise (*Traité complet de chirurgie*, Paris, 1722), repeats the advice already given by preceding authors, to which he annexes the highest importance, that is, the opening in time of abscesses of the gums and of the palate even before they be completely matured, in order to prevent the suppurative process from extending and damaging the bone below. This author relates having several times arrested serious hemorrhage following on the extraction of teeth, by applying a little vitriol inside the alveolus, and, on this, graduated compresses, which the patient pressed on the part with the teeth of the opposite jaw.[2]

Johann Adolph Göritz, of Regensburg, in one of his writings published in 1725, disapproves the too frequent recurrence to extraction of the teeth, that is, carrying out the operation when it is not absolutely necessary. He is also averse to the application of artificial teeth. In support of his opinion he relates a case in which, a certain time after the application of an artificial tooth, the natural ones to which it had been fixed became loose, so that it was necessary to proceed to the fixing of all three, that is, the artificial tooth and the two neighboring ones, to the firm teeth beyond them; these, however, became loosened in their turn, and it was at last necessary to extract six teeth. The great space thus created was filled with a prosthetic piece made of hippopotamus tusk; but the author did not believe much good would come of this either. In fact, he is of opinion that the natural teeth should be preserved by every possible means, and that, on the other hand, even in the case of a few being lost, it is better not to resort to substitutes. In the worst case, should the dental void cause too great inconvenience by damaging the pronuncia-

[1] Sprengel, op. cit., vol. ii, p. 367; Carabelli, op. cit. p. 65.
[2] Sprengel, op. cit., vol. ii, p. 310.


Dum dextrâ et scriptis solamina Dentibus affers,
Illorum in luto sunt decor atque salus.
Invidiæ spernas igitur, FAUCHARDE, cruentos
Dentes; nam virtus frangere novit eos.
Moriau

tion, or for some other reason, it may be filled by an "imitation" in soft wood.[1]

If one takes into consideration the by no means slight inconvenience to which fixed artificial teeth gave rise, one cannot but admit the aversion to them, expressed by Göritz and others, to have been justified.

Ernst Ferdinand Gebauer, in 1726, made known a case in which, a tooth having been badly extracted by an incapable surgeon, the upper jaw was so seriously injured that a diffusive carious process ensued, which after many years' suffering brought the patient to the grave.[2]

Johann Bernhardt Fischer (1685 to 1772), a very famous doctor, born in Lübeck, who had the honor of becoming archiater of the Russian Empire, related, in 1726, a case of replantation, similar to those by Pomaret and Carmeline; but Heinrich Bass (1690 to 1754), of Bremen, professor of anatomy and surgery in Halle, endeavored to demonstrate that in these cases the tooth did not really take root, but was rather maintained in position by the contracting of the surrounding gum. One perceives from this that there were still, at that time, discordant opinions on the subject of replantation, and that this operation was far from occupying, in dental surgery, the accredited position it has acquired today.

Heinrich Bass also combats the abuse of extracting teeth inconsiderately, without absolute necessity, and expresses the opinion that this is especially blamable in the case of teeth of the upper jaw, principally because the extraction of either the canine or of the first or second large upper molars might easily produce the opening of Highmore's antrum, and thus give rise to regrettable accidents. He is not, however, averse, like Göritz, to the use of artificial teeth; indeed, he advises the application of whole dental sets, even in the upper jaw, so long as there be two natural teeth existing to fix the prosthetic piece to.[3]

Pierre Fauchard, the founder of modern scientific dentistry, was born in Brittany about the year 1690, and died at Paris in the year 1761. His celebrated work, *Le Chirurgien Dentiste*, was already written in the year 1723, but not published until 1728. It marks a new epoch in the history of dental art. The most renowned physicians, surgeons, and anatomists of the time testified their admiration for Fauchard's work, which was translated into German in 1733, and afterward went through two French editions in the years 1746 and 1786.[4] We have been able to obtain the

[1] Sprengel, op. cit., vol. ii, p. 309.

[2] Sprengel, loc. cit.

[3] Sprengel, op. cit., vol. ii, p. 310.

[4] Le Chirurgien Dentiste ou Traité des Dents, où l'on enseigne les moyens de les entretenir propres & saines, de les embellir, d'en réparer la perte & de remédier à leurs maladies, à celles des Gencives & aux accidens qui peuvent survenir aux autres parties voisines des Dents. Avec des Observations & des Réflexions sur plusieurs cas singuliers. Ouvrage enrichi de quarante-deux Planches en taille douce. Par Pierre Fauchard, Chirurgien Dentiste à Paris.

second edition[1] of this most important treatise, and of this we now intend making use for accurately analyzing the work, as it is probably more complete than the first, whilst the third, having been published after the author's death, is probably merely a reprint.

The work consists of two volumes in duodecimo, in all 863 pages. In the beginning there is the portrait of the author and a long and interesting preface. The portrait, which we here reproduce, has also its historical importance, and this for two reasons, the first of which being that in it Fauchard is revealed to us as a person of very distinguished appearance, and this gives us an idea of the social condition of the surgeon dentists of his time; the second, because there are annexed to the portrait the following Latin verses, by a certain Moraine, in which, whilst eulogizing the writings of the author and his ability in the treatment of the teeth, and in restoring force and beauty to them, he counsels him "to despise the tooth of envy," as it will certainly break against his merit.

Dum dextra et scriptis solamina dentibus affers
Illorum in tuto sunt decor atque salus.
Invidiæ spernas igitur, Faucharde, cruentos
Dentes; nam virtus frangere novit eos.

That Fauchard, in common with all men of rare merit, had to combat all his life against envy, we are able to perceive from what we read at the end of the second volume of his work. The author here says that "the rumor having been falsely set about that he has abandoned the profession; which rumor cannot have been invented otherwise than by those individuals who, sacrificing honor to interest, would attract to themselves the persons who honor the author with their confidence; he therefore finds it necessary to give warning that he still continues the practice of his art in Paris, in the *Rue de la Comédie Française*, together with his brother-in-law and sole student, M. Duchemin."

More than a century and a half has passed by since Fauchard was obliged to defend himself against lies invented and set about to his damage by envious colleagues, but even at the present day, when, given the high grade that civilization has reached, and professional competition ought not to make use of other weapons than intelligence, study, and application, some do not hesitate to have recourse to means equally disloyal, ignoble, and shameless as those practised by some contemptible dentists of the middle of the eighteenth century.

The preface of Fauchard's book is especially important for the notices therein contained regarding the author, as well as the conditions of dental art at that period. And first of all, we find in it the proof of what we have already said elsewhere, namely, that even before Fauchard, there were not

[1] Deuxième edition revue, corrigé et considérablement augmentée, à Paris, 1746.

A CHARLATAN ON HIS PUBLIC STAGE

only tooth-pullers but also dentists properly so called. Indeed, Fauchard makes mention also of the examination that aspirant dentists had to undergo as far back as the year 1700. It may interest our readers if we here give in detail some extracts in which the author speaks on these subjects:

"Although surgery in general," says Fauchard, "has been greatly perfected in these latter times; although important discoveries have been made in anatomy and in the modes of operating, and many learned and interesting observations have been published, nevertheless, dentists nowhere find in works on surgery sufficient aids to guide them in all their operations." These last words should be sufficient alone to prove that the dentists spoken of by Fauchard were not mere tooth-pullers.

"The authors who have written on anatomy, on surgical diseases and operations, have only treated very superficially the part relating to maladies of the mouth and teeth. If some writers have spoken in particular about the teeth and their diseases, as, for instance, Urbain Hemard and B. Martin, they have not done so in a sufficiently ample manner.

"Besides, there does not exist any public or private course of surgery in which the theory of dental maladies is amply taught and in which one can receive fundamental instruction in this art, so necessary for the healing of these maladies and of those of the neighboring parts.

"This branch of the art having been but little cultivated, if not wholly abandoned by the most celebrated surgeons, their negligence has caused it to fall into the hands of persons without theory and without experience, who practise it in a haphazard fashion, guided neither by principles nor method. In Paris, it is only since 1700 that people's eyes have become opened to this abuse.

"In this town, those who intend to become dentists are now obliged to undergo an examination, but although the examiners be most learned and well versed in all the other parts of surgery, I think, if I may be allowed to express my opinion, that as they do not ordinarily themselves practise dental surgery, it would not be amiss on these occasions to admit an able and experienced dentist, who might sound the aspirant as to the difficulties which have come before him in the course of the long practice of his art, and who could communicate to them the means of surmounting them. In this way one would not have to acknowledge that the attainment of the greater part of dental experts[1] is below mediocrity.

"To supply this want of instruction it would have been of great use if some able dentist, for example the late *Monsieur Carmeline*, who, in his day, practised with general applause, had made us acquainted with

[1] *Experts pour les Dents.* This was probably the title which was bestowed in the relative diploma on those who passed the examination in question.

his mode of operating and with the knowledge acquired through the successful treatment of a great number of important cases.

"What this celebrated surgeon-dentist has not done, I today dare to undertake. I shall at least afford an example of what he might have done with greater erudition and better success.

"From my youth I was destined to the surgical profession; the other arts I have practised[1] have never made me lose sight of it. I was the disciple of Alexandre Poteleret, surgeon-in-chief to His Majesty's ships, who had great experience in diseases of the mouth. To him I owe the first rudiments of the knowledge I have acquired in the surgical speciality I practise, and the progress I made under this able man gave me the emulation that has led me to further important discoveries. I have collected among different writers what seemed to me most reliable. I have frequently discussed these matters with the ablest surgeons and doctors of my acquaintance, and have neglected nothing in order to profit by their counsels and by their ideas.

"The experience which I have acquired during an uninterrupted practice of more than forty years has led me insensibly to the acquirement of further knowledge and to the modification of what seemed to me defective in my earlier ideas. I offer to the public the results of my labors and of my studies, hoping that they may be of some use to those who wish to exercise the profession of surgeon dentist."

The reason why dentists before the time of Fauchard published hardly anything concerning their art, was perhaps out of a sentiment of jealousy, which rendered them (that is, the best of the profession and therefore the ones most capable of writing) but little disposed to make known to others the results of their studies and of their experience, lest the fruits of their long labors should be utilized by others and they themselves be materially damaged by competition. That this sentiment of jealous egotism really existed in many dentists may be, in a certain manner, deduced from a few words of Fauchard himself, who, although he has the very great merit of breaking with mean, old-world prejudices, nevertheless expresses the prevalent idea of the time, consisting in the belief that every artificer, every inventor, had not only the right, but also the duty of surrounding his discoveries with secrecy and mystery. These are the words in which, making known a certain improvement in dental prosthesis invented by him, he at the same time expressed his conviction that by so doing he is acting against his own interests:

"I have perfected and also invented several artificial pieces both for substituting a part of the teeth and for remedying their entire loss, and

[1] We have not been able to find any work in which particular records of Fauchard's life are given, and hence do not know to which of the other arts he had dedicated himself.

these pieces substitute them so well that they serve perfectly for the same uses as the natural teeth. To the prejudice of my own interests I now give the most exact description possible of them."

Now, although a man of elevated mind, such as Fauchard, may have been capable of sacrificing his material interests to higher aims, it is not, however, to be wondered at, taking also into consideration the lesser degree of culture and of professional ability of his predecessors, that none among them should have been found sufficiently disinterested to publish the results of their particular studies and experience, besides all those technical details which according to the ideas of that time constituted the secrets of the profession.

In the course of this history, we have seen that the dental art was practised from the most remote times and in the most various countries, remaining, notwithstanding, for centuries in an embryonal condition. It was toward the end of the seventeenth and the beginning of the eighteenth century that, in the midst of the highly advanced civilization of the great French capital, it attained a high degree of development, entitling it to be considered a special branch of the medical art.

It would, therefore, be wrong to believe that the dental art was created, for the most part, by Fauchard, and one clearly perceives, from the perusal of his work, that although he made most important contributions to this specialty, which he cultivated with passion, nevertheless, the greater part of the things therein treated of were already known before his time, although no reference to them is to be found in previous works; and this for the reasons we have already suggested. The highest merit of Fauchard consists, still more than in his inventions and improvements, in his having most ably collected and incorporated in a single work the whole doctrine of dental art, theoretical as well as practical, thus setting in full light the importance of the specialty, and giving it a solid scientific basis.

France is therefore the first country where modern dentistry reached a high degree of development and also the first country where, earlier than elsewhere, that is, about 1700, the dentists began to form a well-defined class, to belong to which it was necessary to pass a special examination. This examination, as we learn from Fauchard, was held before a commission of which no dentist formed a part, and exactly for this reason gave but negative results and responded but little to its intended aim. The greater number of those who were authorized to practise dentistry after undergoing this examination showed a professional ability below mediocrity. Nevertheless, although few in number, good and able dentists were in no way wanting, as clearly appears from the preface to Fauchard's work, and better still from the following paragraph,[1]

[1] Vol. ii, p. 366.

wherein the author speaks of the great perfection reached by dental surgery in Paris:

"The teeth and the other parts of the mouth being subject, as we have seen in the course of this work, to so many important diseases, requiring the aid of the most able dentists, it is strange that the sovereigns of foreign countries, the heads of republics, and also the administrators of our own provinces do not provide for the expense of sending young surgeons to Paris, to be instructed in a part of surgery so essential, and, notwithstanding, so ignored and neglected everywhere excepting in this great city, where it has reached its highest perfection, both as regards the embellishment of the mouth and the cure of diseases, often of a most serious nature. These scholars would, thereafter, form others and would render great services to their nation and to their fellow citizens."

In the first chapter of his work, Fauchard speaks "of the structure, position, and connection of the teeth; of their origin and of their growth." He distinguishes in each tooth a body, a root, and a neck, making the remark, however, that this last is to be considered as forming part of the body. According to the author, the name of "crown" can only be applied suitably to the body of the molar teeth, but not to that of the incisors or of the canines, which has no resemblance with a crown. Although in the adult the number of the teeth is normally thirty-two, it may be that some persons have, nevertheless, thirty-one, thirty, twenty-nine, or even only twenty-eight teeth, and this independently of any eventual loss, but for the simple reason that the wisdom teeth are often cut very late in life (even after fifty years of age), or do not all come forth, or sometimes are never cut at all. The author refers to some cases of a supernumerary tooth situated in general between the two superior central incisors and similar in form to the lateral incisors. He also observed two individuals who had each thirty-four teeth, sixteen in the lower and eighteen in the upper jaw, and in these cases the two supernumeraries were situated behind the incisors. Fauchard declares the popular opinion expressed also by some ancient authors, of the milk teeth having no roots, to be false. The roots of these teeth, he says, are gradually worn away before the latter are shed, when the permanent teeth are just on the point of coming through; however, if it so happens that one or more of the milk teeth be extracted some time before the period in which they are usually shed, their roots are found to be as long and as strong in proportion to the body as those of the permanent teeth. In children one finds, besides the twenty deciduous teeth, the germs of the thirty-two permanent ones, for which reason it may be said that children have in all thirty-two teeth without counting the germs that may sometimes be found at the extremities of the roots of the large molars. As, however, the existence of such germs is an exceptional fact, the twelve large molars, if extracted, are

not ordinarily regenerated. This may be possible, however, if the germs in question exist, and, indeed, the author observed two persons in both of whom a large molar had been regenerated in the place of the one which had to be extracted.

Fauchard gives an excellent description of the alveoli and of the roots of the teeth; he alludes to the varieties which these latter may present, and to the importance of the same from the point of view of extraction. Thus, speaking of the molars, he says: "Their roots sometimes touch one another at the points, whilst at the base, close to the body of the tooth, they are far apart. These are the so-called *dents barrés* (barred teeth), which it is so difficult to extract, it being unavoidable to bring away together with the tooth the spongy osseous part occupying the interval between the roots."

In this same chapter the author calls our attention to some anomalies worthy of note. He says that he has observed teeth that seemed to him to be derived from the union of two or three germs. He also relates that a colleague of his showed him a tooth that appeared to be formed by the union of two, between the roots of which was a third tooth whose crown was united to the vault formed by the roots of the first two.

Fauchard describes exactly the pulp cavity and the root canals, and speaks of their gradual restriction, ending in an almost entire disappearance in old age.[1] He treats of the nerves, of the arteries, and of the veins of the teeth in a most detailed manner; then, after alluding to their general structure, he goes on to speak of the microscopic constitution of the enamel, following in this the description given of it in 1699 by the academician La Hire.

In regard to the development of the teeth, Fauchard repeats what Urbain Hémard had previously written. He apparently ignores the researches of the Italian anatomists, from whom, and especially from Eustachius, Urbain Hémard had literally reproduced all that concerns odontogeny.

In the second chapter Fauchard speaks "of the maladies of children at the period of teething and of the remedies best adapted thereto." Among other means of treatment, he advises the incision of the gum when this is red, swollen, and distended and the tooth below it can be felt. For the incisors and canines a simple incision ought to be made in the same curve as the dental arch; for the molars a crosswise incision should be made directly down to the tooth below, taking care not to leave any strips of uncut gingival tissue, lest these, being distended by the emerging tooth, should continue to be the cause of pain and other morbid phenomena.

Although Fauchard does not tell us anything substantially new about

[1] Page 21.

teething maladies and their treatment, he nevertheless treats this subject with much practical good sense, and does not merely make servile repetition of what preceding authors have written about it.

In the three following chapters the author speaks of the utility of the teeth, of the rules to be observed for their preservation, of the modes of keeping them white, and of strengthening the gums.

From a passage in the fifth chapter we learn that tooth brushes were then already in use. Fauchard, however, advises the use of small sponges in their stead. He says: "Those who use brushes of horsehair, or pieces of cloth or of linen for cleaning the teeth, do not reflect that all these materials are too rough, and that the practice of using them frequently and without discretion often exercises a destructive action upon the teeth.[1] Not without good reason, I advise the abandonment of this usage, it being preferable, after having had the teeth cleaned by the dentist, to wash the mouth every morning with tepid water, and to rub the teeth up and down, inside and outside, with a small, very fine sponge wetted in water; and it is still better to add to this water a fourth part of aqua vitæ the better to fortify the gums and render the teeth firm."

Instead of a small sponge, says Fauchard, the end of a root of marshmallow or lucern, which has first been subjected to a special preparation, may be used with benefit for rubbing the teeth. The author gives a long and minute description of this preparation, which we, however, omit, because devoid of historical interest.

As, however, the above means are not always sufficient for preserving the teeth and gums in good condition, it is necessary in many cases, says Fauchard, to make use of some paste, powder, or mouth wash. The author mentions a great number of compositions of this kind, giving the formula for each one—almost always most complicated—and indicating the peculiar advantages of each of them. We will here quote one of the formulæ as an example.

"*A spirituous water, desiccative, balsamic, antiscorbutic, efficacious against many maladies of the mouth:*

"℞—good sarsaparilla, four ounces; aristolochia rotunda, dried rinds of bitter organes, of lemons, and pomegranates, *ana* three ounces; pyrethrum, two ounces; cloves, one ounce; mustard seeds, one ounce; wild rocket seeds, two ounces. Pound well in a mortar and put the whole into a retort with a long neck. Add thereto half a pound of pulverized candied sugar and the same quantity of clarified rose honey. Pour in three pints of good spirit of wine. Cork the retort well and leave all to digest in a cool place for five or six days. Then heat the retort forty-eight hours in the water bath over a slow fire, without letting the liquid come

[1] Pages 73, 74.

to the boil. Afterward, when cold, decant in a glass bottle, to be kept well corked. Pour another three pints of spirit of wine on the residue of the drugs; cork the retort again, replacing it in the water bath for forty-eight hours, and regulating the fire as above. Then, after letting it cool, pour off the liquid into the same bottle. Next remove all the residue from the retort, place it in a thick, white linen cloth, and force the remaining liquid through it, and add to that in the bottle. Put back half of the entire quantity of liquid in the same retort, and add thereto aloetic elixir and *baume du commandeur*, *ana* four ounces; pulverized dragon's blood, three ounces and a half; pulverized gum of guaiac and Peruvian balsam, *ana* three ounces; gum lac, two ounces. Cork the retort again and replace it in the water bath for forty-eight hours, as above. Let cool, decant the liquid in another glass bottle, and cork well. Pour the remaining half of the first liquid upon the rest of the drugs, replace the retort in the water bath for forty-eight hours, let cool, and pour the contents in the last bottle. Filter the liquid well, and pour it into a bottle of sufficient size to be able to add the following liquids: aqua vulneraria and first cinnamon water, *ana* three pints; second cinnamon water, three half-pints; spirit of cochlearia, four pints. Shake the bottle well, filter again, and store in well-corked bottles."

The author adds that the doses of the different drugs may be reduced in proportion to the quantity of liquor to be prepared; and that he prepares so large a quantity at a time because of the great sale he has for it among his clients.

The preparation in question is counselled by the author as a remedy against pathological conditions, and of the gums especially. One makes use of it in the following manner: Pour from seven to eight drops into a wineglass of water; wet the tip of the finger and rub the gums and the teeth well. Or mix seven or eight drops in a good spoonful of water, using a fine sponge to rub the teeth and gums.

The example we have cited suffices to show how much care one took at that time in the preparation of substances destined to be used in the preservation of the teeth, and demonstrates at the same time that Fauchard, inventor of that and many other preparations, besides being an able surgeon dentist, was also exceedingly well versed in dental materia medica.

Chapter VII treats of the general causes of dental, alveolar, and gingival diseases, and contains the complete enumeration of these maladies. The causes of dental affections may be of two orders, viz., internal (general diseases, dyscrasic conditions) and external (the action of heat and cold, mechanical causes, etc.).

After having spoken in particular of various causes, Fauchard adds: "Little or no care as to the cleanliness of the teeth is ordinarily the cause of all the maladies that destroy them."

The author divides maladies of the dental apparatus into three classes, that is:

1. Maladies deriving from external causes and acting, therefore, especially on the crown or uncovered part of the tooth.

2. Maladies of the hidden parts of the tooth, that is, of the neck and root.

3. Symptomatic maladies, deriving from the teeth.

In the first class the author includes 45 pathological states, 17 in the second and 41 in the third, making up a total of 103 morbid conditions. This should be sufficient to give us an idea of the accuracy with which Fauchard studied the maladies of the dental apparatus, especially if one considers that preceding authors had reduced these maladies to a very small number. Fauchard's classification is very complete, for notwithstanding the progress made in succeeding years in this science, the pathological conditions not to be found comprised in it are exceedingly few. Naturally, the 103 diseases enumerated by Fauchard do not represent as many distinct morbid entities. The author, in classifying dental maladies, keeps especially in view the requirements of the practitioner, and therefore makes numerous distinctions in each morbid process. Thus, he distinguishes a great many varieties of caries, viz., the soft and putrid caries, the dry caries, the caries in part dry and in part soft, the caries complicated by fracture, the superficial caries, the deeper and the deepest, the caries of the different surfaces of the crown, and so on. Also in the classification of other morbid processes, Fauchard makes multifarious distinctions.

The passage referring to worms in the teeth deserves to be here reproduced:[1]

"Sometimes worms are to be found in the carious cavities of the teeth, or in the deposit of tartar that covers them, and to these the name of dental worms has been given. Observations recorded by illustrious authors are extant which attest this. Not having ever seen these worms, I neithet admit nor deny their existence. Nevertheless, I conceive the thing nor to be physically impossible, although at the same time I do not believe at all that these worms destroy the teeth or cause them to decay, but rather that the eggs of some insect having been introduced into the carious cavity of the tooth, either through alimentary substances or through the saliva, these eggs thus deposited have developed and produced the worms alluded to. However this may be, as they are not the real cause of the caries, their eventual presence does not require any particular consideration." Fauchard again recurs to the subject of worms in Chapter VIII, in speaking of the particular causes of caries.[2]

[1] Vol. i, p. 131.

[2] Page 142.

"It was, and is still, believed by the vulgar and also by some writers that all toothache is caused by worms, which little by little destroy the tissue of the osseous fibers and the nervous threads. If this were so, the explanation of pains and of decay in the teeth would be very simple. This opinion is founded on pretended experiences relating to these insects, which may, it is said, be made to fall out of the teeth by the smoke of henbane seeds; this, however, has been declared fabulous by Andry, dean of the medical faculty of Paris, as well as other similar facts which he exposes in his book on the generation of worms.[1]

"Andry relates, however, that with the help of the microscope one may succeed in seeing certain worms that form beneath the deposit collected upon the teeth as the effect of want of cleanliness; these worms, he says, are exceedingly small and characterized by a small round head with a small black spot; the body is long and fine, pretty nearly like the worms seen in vinegar through the microscope. He adds that these worms destroy the teeth little by little, causing a bad odor, but not much pain. He believes it an error of the imagination to ascribe violent pains in the teeth to dental worms, and holds that these only produce a very slight, dull pain accompanied by itching.

"I have done everything possible," continues Fauchard, "to convince myself with my own eyes of the existence of these worms. I have made use of the excellent microscopes of Manteville, sworn surgeon of Paris, and have made a great number of experiments with them both on caries in teeth newly extracted as well as on tartar of different consistency accumulated on the same, but have never succeeded in discovering any worms. I am also still less disposed to believe in the existence of these animals, because Hémard declares that he has never been able to find any worms in carious cavities. I am thoroughly convinced of Andry's sincerity; neither do I doubt the truth of the facts he relates; but it is easy to perceive from his own words how little the pretended healers of teeth and their specifics for killing worms are to be held in account; from the moment that, according to this writer, the pains for which one is most obliged to have recourse to remedies are almost always those not proceeding from the cause in question."

In short, Fauchard does not believe at all that dental caries is occasioned by worms; and only from respect for the authority of Andry and other writers does he admit the accidental existence of these little animals in the carious cavities or upon the teeth, refusing, however, to attribute any importance to the same as regards the etiology of caries.

This disease, says Fauchard,[2] is produced by a humor that insinuates itself into the midst of the osseous fibers of the teeth, and displacing the

[1] De la génération des vers dans le corps de l'homme, Paris, 1700. [2] Vol. i, p. 143.

particles which compose these fibers, gives rise to their destruction. The causes from which these disorders derive may be external or internal. The external causes are blows, violent efforts made by the teeth; the improper use of the file, the application of acids or of other substances that injure the enamel, alteration of the saliva, impressions of heat or cold, and also certain kinds of nourishment. Blows or violent efforts may produce caries, according to the writer, by occasioning the effusion of the liquid contained in the vessels. The author gives analogous explanations for the other external causes. As to the internal causes, they consist, he says, in alteration of the blood and of the humors.

The teeth, says Fauchard, are more subject to caries than all the rest of the bones in the human body, because, their tissues being denser, the vessels are on this account closer together and more easily liable to be obstructed, choked up, and broken. Besides, the position of the teeth exposes them more than the other bones to the immediate action of external causes capable of producing the disorders alluded to; and finally, what demonstrates the dental caries to be produced, for the most part, by external causes, is that false teeth, either human or formed from those of animals, sometimes become carious just in the same way as the natural ones; which evidently happens by the sole action of external causes.

It is undeniable that the ideas expressed by Fauchard on the pathogeny of caries, cannot hold good against criticism. Nevertheless, we owe a great deal to this author for having once for all put an end to the ridiculous theory of dental worms, and for having tried to find a reasonable explanation of the manner in which caries is produced.

The teeth, says Fauchard, have not all the same disposition toward this morbid process; indeed, notable differences are to be observed in this respect. The molars are, in fact, more apt to become decayed than the incisors or the canines; and the upper incisors and canines are more subject to this disease than the inferior ones, because, by reason of their position, they are more frequently uncovered and more exposed to heat and cold, whether in eating and drinking or whether in the mere aspiration or expiration of the air. It is to be observed, besides, that when the eruption of the last molars is considerably delayed they easily decay.[1]

Having very frequently observed the symmetrical decay of corresponding teeth on both sides of the same jaw, Fauchard considers that these cases are not simply accidental, but rather holds that the fact depends on a special cause, which, however, is not easy to determine. He offers, at any rate, a sufficiently good explanation when he says that as certain morbid causes (bad humors, etc.) must affect both sides of the mouth identically, it is but natural that the effects of such causes should be

[1] Page 149.

altogether analogous on the right and on the left, and manifest themselves symmetrically on teeth having the same configuration, the same structure, and the same consistence.

Before speaking of the treatment of caries,[1] Fauchard alludes to the fallaciousness of the many remedies against toothache which were largely sold at his time by charlatans and impostors of every kind.

"Some pretend to cure toothache with an elixir or some special essence; others with plasters; others by means of prayers and signing with the cross; others with specifics for killing the worms that are supposed to gnaw the tooth and so cause pain; others pretend to be so clever that they can cure the most inveterate toothache by merely touching the tooth with a finger dipped into or washed with some rare and mysterious liquid; others finally promise to cure every kind of toothache by scarifying the ears with the lancet or cauterizing them with a red-hot iron."

"I am well aware," adds Fauchard, "that it can be alleged in favor of this last prejudice that the celebrated Italian doctor Valsalva indicates with great precision the point in which the actual cautery is to be applied to the ear, in order to calm toothache. He also determines the size of the iron and the manner of applying it. The authority of so celebrated an author, whose opinion is certainly worthy of respect, should induce me to believe that there may perhaps be some cases in which it is possible to use this remedy with success; nevertheless, I cannot persuade myself that such treatment can be useful in common cases of toothache.

"At Nantes, a city of Brittany, I knew a Turk, a watchmaker by profession, who was renowned for this mode of curing toothache. But I also know that, in spite of the pretended cures, the greater number of those who put themselves into his hands were obliged finally to have recourse to me, in order to find relief for their sufferings. I afterward saw several other persons use the same remedy with no better success.

"There are, besides, an infinity of other remedies vaunted as efficacious against toothache, but the greater number of them are so ridiculous and extravagant that it would be both tiresome and useless to speak of them. We will, nevertheless, give one more mentioned by M. de Brantôme."[2]

The author here quotes a passage of this writer, wherein he says that, having been suffering from toothache for two days, the apothecary of Elizabeth of France, wife of Philip II of Spain, brought him a most singular herb, which when held in the hollow of the hand had the virtue of making the pain cease immediately; and in this way he was, in fact, effectually cured.

And here Fauchard expresses himself of the same opinion as Urbain Hémard, who believes the cure of toothache by means of words, or by the

[1] Chap. ix, p. 154.

[2] Dames illustres, vie d'Elizabeth, p. 179.

touch of paper on which certain signs are written, or remedies held in the hand, etc., to be merely the effect of the force of the imagination, and he opines that the patient, having a vivid belief in the mysterious thing proposed to him remains under the impression of an inward commotion, by the effect of which it may well be that the morbid humor is deviated from the painful part to other parts of the body. The effects of the various passions on the bodily functions are, says Fauchard, very well known. Thus, when under the influence of anger the wounded at times do not feel any pain, and those who suffering from a tormenting toothache go to a dentist to have the tooth drawn are sometimes seized by such great fear as not to feel the pain any longer, and go away, only to return later on renewal of their sufferings; although there have been cases where the pain ceased altogether.

In spite of this explanation, of which we will not here discuss the value, allowing it, however, as satisfactory enough, Fauchard continues by making a most curious consideration, which as it is of a somewhat surprising effect in a scientific work, we will not deprive our readers of it. He believes it to be his duty to give the following warning, namely, that "the modes of cure, by means of certain words, of certain signs, laying on of hands, written charms, etc., savoring much of superstition and of diabolic artifice, are prohibited by the Church as sinning against the first Commandment, as much in him who practises them as him who consents thereto."

After the above preliminaries, the author passes on to treat the important subject of the mode of curing caries.[1] According to him, when caries has not yet attacked the internal cavity of the tooth at all, or only in a very slight degree, there are four modes of curing it: the first consists in the use of files or scrapers, the second in the application of lead, the third in the use of oil of cinnamon or of cloves, and the fourth in the application of the actual cautery. Fauchard expresses most energetically his disapproval of the means of cure recommended by Dionis in cases of caries of the triturating surfaces, which consisted in the cauterizing of the decayed spot with a drop of oil of vitriol applied by means of a miniature paint brush, declaring this to be both dangerous and hurtful because of the destructive and corrosive action of the oil of vitriol and because of the impossibility of limiting its action solely to the affected part of the tooth.

The general method of cure followed by Fauchard is described by him in these terms:

"When a tooth is but slightly decayed, it is sufficient to remove the caries with the instruments of which I will speak hereafter, and to fill

[1] Page 161.

the cavity with lead. If, however, the cavity be rather deeper and occasions pain, one should, after having scraped it, put a small ball of cotton-wool soaked in oil of cinnamon or of cloves into the hollow of the caries every day. This medication must be continued for a sufficient time, taking care to squeeze in the cotton-wool by degrees to accustom the sensitive parts to the pressure. Four or five days later one removes the material from the carious cavity. This treatment sometimes prevents a return of the pain; it produces on the osseous fibers of the tooth a slight but sufficient exfoliation and impedes the progress of the caries. If the pain should not cease after having continued this method for a sufficient length of time, one should then have recourse to the actual cautery and stop the tooth after a certain time, if the form and situation of the decayed cavity permit it; for one sometimes meets with cavities that are not able to maintain the stopping.

"If the caries penetrates as far as the cavity of the tooth, it may give rise to an abscess; and this I have often observed in persons to whom the caries of the incisors or of the canines occasioned great pain. In such cases I introduce the extremity of the sound into the cavity of the tooth in order to facilitate the evacuation of matter. As soon as the pus is evacuated the pain ceases. I then leave these patients in repose for two or three months; after this time, I stop the decayed tooth or teeth to avoid their getting worse."

As anyone may perceive, the methods used by Fauchard against caries left much to be desired, when compared with those now in use. With such imperfect methods it is but natural that one did not always succeed in obtaining the immediate cessation of the pain resulting from caries. The want of additional remedies was, therefore, felt; and, in fact, Fauchard tells us[1] of two with which he had experimented and found most efficacious against toothache. The first is a resinous plaster to be applied to the temples; the other is a paste to be applied, in quantity equal to the size of a small bean, between the gums and the cheek, and which was composed of various ingredients, among others, pyrethrum, black pepper, ginger, stavesacre, mace, cloves, cinnamon, sea salt, and vinegar. After having given the mode of preparation and application of the two above-mentioned remedies, Fauchard adds: "These remedies prove especially efficacious if one takes care to introduce a little cotton-wool or lint into the decayed cavity, soaked in oil of cloves, or cinnamon, mixed with an equal quantity of extract of opium, and if one resorts opportunely to bleeding and purging; which ought never to be neglected in the case of plethoric persons."

Finally, the author speaks of another remedy,[2] and one which we

[1] Page 165.

[2] Page 167.

never should have expected to find in his book; but he assures us that by it many persons who had almost all the teeth decayed and suffered very often from toothache found great relief.

"It consists in rinsing the mouth every morning and also in the evening before going to bed with a few spoonfuls of one's own urine immediately after it has been emitted, always provided the individual be not ill. One is to hold it in the mouth for some time, and the practice ought to be continued. This remedy is good but undoubtedly not pleasant, except in so far as that it procures great relief. Some of those to whom I have recommended it, and who have used it, have assured me that in this manner they were relieved of pain to which, up to then, they had continually been subject. It is rather difficult in the beginning to accustom one's self to it; but what would one not do to secure one's self health and repose."

In order to explain the virtue of the urine as a remedy, the author pauses to speak of its chemical composition, and then adds:

"The rectified spirit of urine[1] could be substituted for the human urine. One should then take two drams of this substance and mix it with two or three ounces of aqua vitæ, or water of cresses or of cochlearia. Sal volatile[2] has the same virtues. Those who wish to make use of it should dissolve fifteen to thirty grains of it in the same quantity of the above liquid."

Fauchard then passes on to speak of trepanning of the teeth when they are worn away or decayed and cause pain.[3] He begins by saying that most varieties of pain caused by the canines and the incisors when worn away or decayed cease after the use of the trepan. He, however, understands the term trepanning in a very wide sense, comprehending therein the use of any instrument whatever (even a needle or a pin) with which one penetrates into the inner cavity of the teeth.

In interstitial caries of the canines and incisors one ought, says Fauchard, first to enlarge the interstice with a small file of a convenient shape, then to scrape the decayed cavity, and finally to open up the canal or inner cavity of the tooth with a perforator or with a small trepan.

"In this way the pus or other humors that may have collected in the tooth can easily find their way out, and the pain will cease at once or in a short time."

The author describes with much minuteness the manner of trepanning, and then adds:

"After this operation one should let a few weeks pass without doing anything to the affected tooth, and afterward, in order to impede further decay, one must put a little cotton-wool into it soaked in oil of cinnamon

[1] Liquid ammonia. [2] Subcarbonate of ammonia. [3] Chap. x, p. 169.

or of cloves. The tooth must be left in this state for some months, taking care to renew the cotton-wool. It is necessary to observe that in beginning to put in the cotton-wool this should be done with lightness and without pressing it down much, so that if pus should gather again it may be able to make its way through the cotton-wool, the principal object of this being to hinder the penetrating of alimentary substances into the tooth, which would be the cause of further decay. If the cotton were pressed into the tooth from the beginning, the pus, not being able to find an exit, would accumulate, and might cause much pain, if the nervous parts of the tooth were not yet dried up or destroyed. The same thing might happen after the application of a lead stopping, and one would be obliged to remove it and let considerable time pass before putting it in again."

Further on the author says that while the trepanning of incisors or canines almost always causes the pain to cease, by opening up an exit to the morbid matter retained within the cavity of such teeth, the same is not the case with the molars, these having several roots and several cavities, of great variety, which lend themselves but little to accurate trepanning. "Hémard," he adds, "judges it necessary to extract these teeth, or at least to break off the crown (*les déchapeller*), in order to give exit to the corrupt matter that is closed up in the cavity; this sometimes causes the pain to cease. He (Hémard) says that he has seen many abscesses in the interior of teeth, which were not externally decayed, and that after having broken off the crown he found within the cavity a corrupt matter of an insupportable smell."

Relative to such cases, Fauchard says that, besides the teeth, also the surrounding parts suffer and are imperilled by these conditions. "The greater part of the violent fluxions deriving therefrom often terminate in abscesses and fistulæ of the gums and of the surrounding parts, and sometimes with considerable and dangerous decay of the bone, as I have related in some of my observations."

One sees that Fauchard was clinically very well acquainted with the grave forms of pulpitis and their possible consequences, although ignoring the true nature of this process, which has only been studied and illustrated much more recently.

Chapter XL (page 177) treats of dental tartar, of its cause, of the harmful effects it produces, and of the prophylaxis and therapy relating thereto. Three illustrations which are added to this chapter represent the different aspects of a mass of tartar of exceptional size formed around the body of a lower molar. The surgeon Bassuel, a friend of the author, had removed this mass of tartar, together with the entire molar, from the jaw of an old woman. The mass itself was almost the size of a hen's egg, the superficies being very irregular; it rendered mastication altogether

impossible and caused the cheek to stand out in such a way as to give the appearance of a tumor.[1]

In the following chapter[2] the author enumerates the various dental operations: "Cleaning the teeth, separating them, shortening them, removing the caries, cauterizing, stopping, straightening crooked teeth, steadying loose teeth, trepanning, simple drawing of teeth, replacing them in their own alveoli, or transplanting them to another mouth, and finally substituting artificial teeth for those wanting." He then adds: "All these operations require in him who carries them out a light, secure, and skilful hand and a perfect theoretic knowledge, by which he may decide on the opportuneness of performing them, of deferring them, or of abandoning them altogether. In fact, one may know perfectly well how to carry out an operation and nevertheless undertake it in a case in which it is not at all proper to operate. Into such an error no one can fall save through sheer ignorance of the cause of the disease or of the right means of curing it. From this it must be concluded that the knowledge required in order to be a good dentist is not so limited as some imagine, and that the imprudence and the danger of placing one's self in ignorant hands is as great as the temerity of those who undertake to exercise so delicate a profession without the knowledge of even its first elements."

Before speaking in detail of all the above operations, the author dedicates a lengthy chapter[3] to describing with the greatest minuteness the position to be given in general, as well as in special cases, to the head and body of the patient, and the manner in which the dentist should place himself with regard to the former, so as to be able to make a proper use of each of his hands. As a rule, Fauchard made the patient seat himself in a convenient arm-chair; in exceptional cases he placed him on a sofa, or on a bed. He draws this subject to a close with the following words:

"It is, indeed, surprising that the greater part of those who practise tooth drawing should ordinarily seat the patient on the ground, this being both indecent and not very clean. This position is not only uncomfortable, but causes sometimes a sense of fear, especially in pregnant women, to whom it may, besides, prove very harmful. But it is still more surprising that certain authors should even nowadays affirm this to be the most convenient position, while it is instead one to be entirely rejected."

In speaking of extraction of the teeth,[4] Fauchard begins by saying that the milk teeth, although destined to be shed, should never be extracted, except in cases of absolute necessity, as, for instance, when being decayed, they give rise to intolerable pain. The alveoli of the infantile jaw are

[1] Page 407.
[2] Chap. xii, p. 183.
[3] Chap. xiii, p. 185.
[4] Chap. xiv, p. 194.

weak, whilst the roots of the deciduous teeth are sometimes firmer and more solid than one would believe, and hence it is that in extracting a milk tooth one runs the risk of injuring the alveolus and even of carrying away a portion of it altogether with the tooth, not to speak of the danger of damaging or even destroying the germ of the permanent tooth lying below. Besides, Fauchard adds, there are sometimes deciduous teeth that are never shed and never renewed. One must, therefore, defer drawing children's teeth as long as possible unless they are loose. When, however, intolerance of pain or a caries endangering the integrity of the neighboring teeth oblige one to recur without delay to extraction, one should carry out the operation with prudence and judgment, so as to avoid the dangers alluded to. It sometimes happens, says Fauchard, that one finds in children a crooked tooth by the side of a straight one; in these cases ignorant tooth drawers have often been known to remove the crooked (permanent) tooth, and to leave the straight, viz., the deciduous one, which afterward falls of itself, the individual thus remaining deprived of one of his teeth for the rest of his life. The rule to be observed in order to avoid a similar error is always to extract the older of the two teeth and to leave the one that has been cut more recently, which is easily recognized by its being ordinarily firmer in the socket and of a better color than the first.

And here the author inveighs against all the charlatans of his day who dared, without being dentists, to perform dental operations, and whose number, it would seem, was ever increasing, so much so that he is led to exclaim: "There will shortly be more dentists than persons affected with dental diseases!" In proof of this he relates the case of a cutler of Paris, who extracted the molar tooth of a young girl because black spots having appeared on it, he believed it to be decayed; but perceiving that he had only removed the crown (it was a deciduous tooth about to fall out), and thinking that he had broken the tooth, proceeded to extract the root, removing, in his gross ignorance, the permanent tooth on the point of coming through.

Returning to the indications for the extraction of teeth, Fauchard says that when a tooth planted irregularly in the mouth cannot be straightened by any of those means to which he afterward alludes, and occasions damage or inconvenience or constitutes a deformity, the sole remedy is its removal. As to decayed teeth and the pain that they produce, when the evil cannot be remedied with oil of cinnamon or oil of cloves, with the actual cautery, or by stopping, one must have recourse to extraction, and this to satisfy four different indications, that is, before all, to procure the cessation of violent pain; in the second place, to prevent the caries from being communicated to the neighboring teeth; thirdly, to remove the fetid smell deriving from the substances that are retained within the

carious cavity, and to impede the teeth on the same side from becoming covered with tartar, as inevitably happens when by reason of painfulness in eating they are forced to be inactive; fourth and lastly, because the dental caries, not infrequently gives rise to other diseases, which ordinarily cannot be cured unless the cause from which it arises be recognized and suppressed.

"Sometimes," continues Fauchard, "such violent and obstinate pain arises in a tooth that we are obliged to extract it, although not decayed nor presenting deformity."

The author combats the old prejudice, that it is not right to draw teeth in cases of pregnant women or of nursing mothers, lest the operation should prove dangerous to the patient or to the fetus, or produce alteration or arrest of the milk secretion. Only the fear arising from this prejudice can, according to the author, cause any of the dreaded contingencies. The dentist ought, therefore, to seek to dissipate the fears of these patients, by persuading them of the innocuous nature of the operation as well as of its short duration, and should represent to them, on the other hand (if the operation be really necessary), the advantages of promptly deciding on it, to avoid the harm and the peril that prolonged suffering and the tortures of sleeplessness might occasion to themselves as well as to the unborn child or to the suckling infant, such as abortion, premature confinement, alteration of the milk, etc.

According to Fauchard, "one should always take the precaution of hiding the instruments from the patient's sight, especially in the case of extracting a tooth, so as not to terrify him."

The author then speaks of cases where it is necessary to open the jaws by force;[1] of the instruments to be used; of the mode of employing them; of all the precautions to be observed under such circumstances; of the necessity that may eventually arise of sacrificing some one tooth when the enforced opening of the jaws has been impracticable; of the advisability of sacrificing preferably in such cases one of the premolars in order to damage as little as possible the masticatory function and the appearance of the face; of the instruments best adapted for carrying out this operation; of the danger it presents and of the best mode of avoiding it; finally, of what it is necessary to do in given cases to keep the mouth open, in order to not be obliged to repeat the operation a second time.

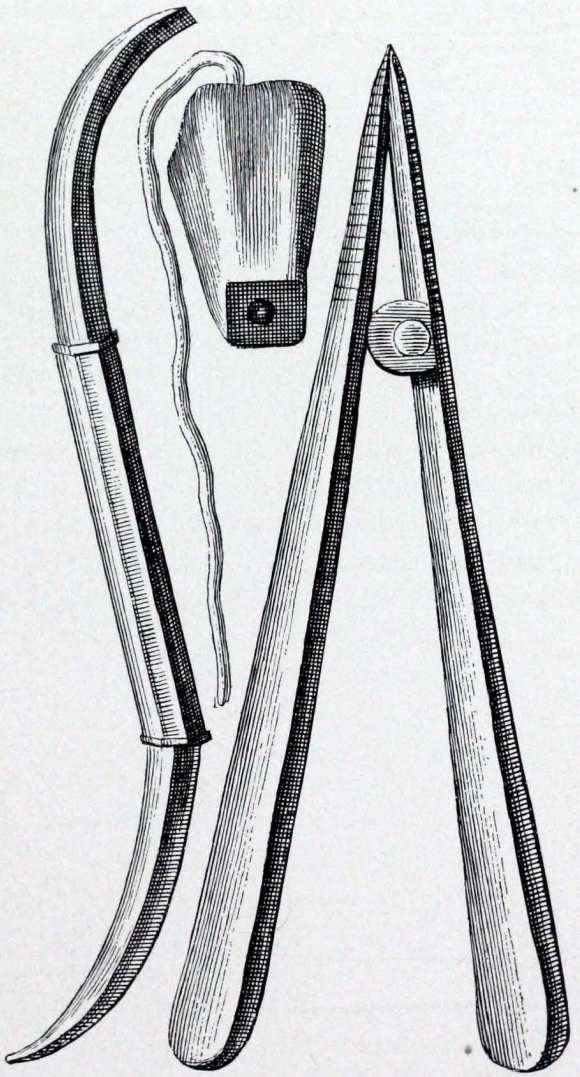
The six following chapters of the first volume treat very extensively of the anatomy and physiology of the gums,[2] of gingival diseases and their treatment.[3] The subject is treated in a masterly manner, although these chapters do not offer anything of original importance.

[1] Chap. xv, p. 205. [2] Chap. xvi. [3] Chap. xvii to xxi.

The same may be said of Chapter XXII, in which the author speaks of scorbutic affections and of their treatment.

The chapters we have cited are accompanied by four plates, representing thirteen instruments for use in the treatment of the above diseases.

FIG. 78



Instruments for opening the mouth in cases of lockjaw (Fauchard).

The author then speaks[1] of the accidents which may arise from caries and from other dental diseases, not only in the parts nearest to the teeth, but also in localities more or less distant from them, for example, fistulæ

[1] Chap. xxiii, p. 282.

reaching as far as the cheek bone or the eye, necrotic destruction of the maxillary bones, etc.

The first volume of Fauchard's work finishes with a collection of most interesting cases, which may be read even at the present day with pleasure, and from which one may derive some useful information. These cases are about eighty in number, spread over fifteen chapters, according to the various nature of the cases themselves. This valuable collection gives clear evidence of Fauchard's eminence both as operator and observer, and affords at the same time an idea of the extent of his practice which enabled him to collect so considerable a number of cases of more than common interest.

Chapter XXV contains some observations on "*well-authenticated cases*" of regeneration of permanent teeth in individuals of ages varying from fifteen to seventy-five years. We will here give two of them by way of curiosities:

"In the year 1708 Mademoiselle Deshayes, now the wife of M. de Sève, residing at Paris in rue de Baune, and who was then fourteen years of age, had the first large molar on the right side of the inferior jaw extracted by me, because decayed and causing pain. The following year she returned to have her teeth cleaned by me, and whilst doing this I observed that the tooth extracted had been wholly regenerated."[1]

"In the year 1720 the eldest son of M. Duchemin, player in ordinary to the King, who was then sixteen years old, came to me to have the second large molar on the left side of the lower jaw extracted. It was very much decayed. I drew it, and a year and a half after the tooth was completely regenerated."[2]

In Chapter XXVIII the author relates twelve cases of dental irregularities corrected by him with satisfactory and at times even surprising results. We here refer, in Fauchard's own words, to the last two of these cases, not because of their being the most important, but because from them it is evident that Fauchard was not the only dentist who undertook such corrections, although he was perhaps the only one who, in certain cases, carried them out with a rapid method.

"In the year 1719 M. l'abbé Morin, about twenty-two years of age, whose countenance was greatly deformed from the bad arrangement of the incisors and canines, consulted various colleagues of mine as to the possibility of correcting the irregularity of his teeth. Some found the thing so difficult that they advised him to do nothing at all, that is, not to risk any attempt. He came to me by chance one day whilst another dentist was with me. We both examined his mouth with much attention. Now, as this dentist was my elder, and I believed him to have more experi-

[1] Page 330. [2] Page 331.

ence than I had, I begged him to give me his opinion as to the best method to follow in this case, in order to insure success. Whether it be that he would not give me advice, or that he was not in a position to be able to do so, the fact is, that his answer was not such as I could have wished. I therefore felt myself obliged to tell him that I hoped to put this gentleman's teeth in order within three or four days. My colleague was not aware that this could be done so quickly; urged by curiosity, he returned when the time I had indicated had elapsed, and found, not without surprise, M. Morin's teeth reduced to perfect order."[1]

"Several years ago the wife of M. Gosset, Reviseur des Comptes, sent for me to examine the teeth of her daughter, then twelve years of age. I found the lateral incisor on the left side of the lower jaw strongly inclined toward the palate in such a manner as to constitute a real disfigurement. Interrogated by the mother as to the possibility of remedying this, I replied that it could easily be done in eight or ten days, with the method of threads, if the young girl were only sent every day to my house. As, however, the young lady received instruction from several masters who came to her house each day, my proposal was not accepted, in order not to distract her from her studies. This induced me to say to the mother that, if she were willing, I would put the crooked tooth into its natural position in a few minutes. Surprised at so short a time being demanded for the operation, she consented to my performing it immediately. Making use of the file, I began by separating the tooth from the neighboring ones which pressed upon it, slightly diminishing the space it ought to have occupied. This done, I straightened the tooth with the pelican, placing it in its natural position, to the great astonishment of the young girl's mother and of other persons present, who told me they had many times seen similar corrections that had been carried out by the late M. Carmeline and others, never, however, with this method or in so short a time. As soon as I had reduced the tooth to its normal position I fixed it to those next to it by means of a piece of common thread, which I left there eight days; and during that time I made the young girl rinse her mouth four or five times a day with an astringent mouth wash. After the tooth had become firm, it would not have been suspected that it had ever been out of its normal position."[2]

In Chapter XXX the author gives an account of five cases of dental replantation and one of transplantation. This last operation was carried out on a captain who had the upper canines on the left side decayed and aching; he inquired of the author if it were possible to draw it and replace it by another person's tooth. Having received an affirmative reply, the officer sent immediately for a soldier of his company to whom he had

[1] Page 368. [2] Page 370.

already spoken on the subject. This man's canine was found by Fauchard to be too large; nevertheless, for want of better he extracted and transplanted it, after having diminished it in length and in thickness. This it was not possible to do without the cavity of the tooth remaining open, and for this reason, when, after about two weeks' time it had become quite firm, he stopped it. But the stopping immediately caused such insupportable pain (which circumstance astonished the writer not a little) that he was obliged to take it out again the following day, on which the pain ceased directly. Fauchard saw this patient eight years afterward, and was assured by him that the transplanted tooth had lasted him six years, but that its crown had been gradually destroyed by caries. The root had been extracted by a dentist, not without considerable pain.[1]

We now give one of his cases of replantation in the words of the author himself:

"On April 10, 1725, the eldest daughter of M. Tribuot, organ builder to His Majesty the King, called on me; she was tormented by violent toothache caused by caries of the first small molar on the right side of the upper jaw; but although she was desirous of having the tooth removed, to be freed of the pain, she, on the other hand, could not, without difficulty, make up her mind, thinking of the disfigurement which its loss would occasion, and thus it was that she was induced to ask me if it would not be possible to put it back again after having extracted it, as I had already done in the case of her younger sister. I replied that this might very well be done, provided the tooth came out without being broken, without any splintering of the alveolus, or great laceration of the gum. The patient, upon this, completely made up her mind. I extracted the tooth very carefully so as not to break it, neither were the gum nor the alveolus injured in any way. I therefore was induced to put the decayed tooth back in its alveolus, and having done this, I took care to tie it to the neighboring teeth with a common thread, which I left in position for a few days. The tooth became perfectly firm, and only caused pain for two days after being replanted. . . . To better preserve it, I stopped the carious cavity."[2]

Not without interest is a case of disease of Highmore's antrum, originating in the following way. A charlatan attempted to extract by means of a common key a canine tooth which had erupted in an abnormal position. He applied the hollow of the key to the tooth and beat upon the handle with a stone. But the tooth, instead of penetrating into the hollow of the key, was driven into the maxillary sinus.[3]

Two important cases of "stony excrescence" of the gums (probably osteomas) are to be found in Chapter XXXII. One of these tumors

[1] Page 383. [2] Page 376. [3] Chap. xxxi, p. 391.

was removed by the dentist Carmeline after the patient had been tortured with useless operations by surgeons, who, not recognizing the true seat of the evil and mistaking it for a tumor in the cheek, had, over and above all the rest, produced a permanent disfigurement of the patient's face and a perforation of the cheek that he was obliged to keep closed for the remainder of his life with a wax plug, to prevent the exit of the saliva and of liquid or masticated aliments.[1]

Several important observations on obstinate cases of cephalalgia, prosopalgia, otalgia, and other varieties of pain arising from dental caries are to be found in Chapter XXXIII. In all these cases the removal of the decayed tooth or teeth procured the prompt cessation of pain. Among others worthy of note is a case of violent otalgia caused by the decay of a lower molar, which, however, was itself not painful. This circumstance drew Fauchard himself into error, causing him to believe that the otalgia was independent of the decayed tooth; he therefore merely stopped the tooth to prevent the caries from extending farther. The pain in the ear continued, however, and the patient therefore consulted a doctor of the Faculty of Paris, Coutier, who told her that the decayed tooth might be the cause of the earache, and that, therefore, before undertaking any other cure, she ought to have it extracted. This advice was followed and the earache ceased promptly and completely.[2]

In another case a patient twenty-seven years of age was tormented by violent pain in all her teeth on the left side, in the temple and the ear, as well as in the chin, the palate, and the throat. The doctors and surgeons consulted decided the cause to be rheumatism. The patient was bled not less than four times and subjected to various other methods of treatment (purgatives, clysters, poultices, etc.), but all in vain. She, however, perceiving that one of her teeth was decayed, had it taken out. It was believed that the cause of the malady had thus been found and removed; but an hour later the pain began again with the same violence as before, continuing for some months; after this it ceased of itself. On the return of the pain, later on, in all its former intensity, the patient consulted the very able surgeon Petit, who advised her to see Fauchard, as possibly the malady might have its cause and point of departure in some bad tooth. Fauchard found one of the inferior molars decayed. This being extracted, the pain promptly ceased, not to return any more.[3]

Chapter XXXV contains twelve cases of serious maladies arising from dental diseases. One of these cases was observed in a patient aged fifty-seven years, who in consequence of caries of the last inferior molar on the right lost through necrosis a considerable portion of the lower jaw, including the whole of the right condyle; he was affected,

[1] Page 397. [2] Page 411. [3] Page 418.

besides, with caries of the temporal bone, in so advanced a degree that the probe could reach the dura mater; he was, therefore, in serious danger of his life, had to undergo several surgical operations of exceptional gravity, and even after recovery remained permanently subject to various disturbances, such as a salivary fistula, paralysis of the lower eyelid, etc. And all this because the surgeons whom the patient had called in had directed all their attention to the secondary facts, instead of suppressing the primary cause of the evil, represented by a dental affection.

A case observed by the surgeon Juton and communicated by him to the author is also a very important one. The patient was suffering with a large abscess on the right side of the lower jaw, accompanied by such great swelling of the cheek that it was impossible to open the mouth wide enough to examine the teeth. Juton proposed opening the abscess immediately, but the patient would not consent. The following day he was sent for in great haste. The gathering had changed its seat, making its way between the skin and muscles of the neck, where it now formed so huge a tumefaction that the patient was in danger of being suffocated. The abscess was now immediately opened, but the swelling of the face still persisted; it was therefore only after a month had elapsed that it was possible to extract the root of the last molar, which had been the original cause of the whole malady. The surgeon observed that the liquid injected into the fistulous opening in the neck issued from the alveolus of the last molar. After the extraction of the root a prompt recovery was effected.[1]

The second volume of Fauchard's work is entirely devoted to operative dentistry and prosthesis.

Before speaking of the modes of cleaning, filing, and stopping the teeth, the author combats the opinion maintained by some, that these operations are in part useless, in part also dangerous, as having the effect of loosening the teeth, of depriving them of their enamel, and ruining them.

Fauchard then describes the instruments proper for detaching the tartar;[2] he speaks of the method to be followed in cleaning the teeth in order to not endanger the enamel;[3] he speaks of the different kinds of dental files, of their different uses in relation to the various cases and indications; of the precautions to be taken in making use of them;[4] of the instruments to be used for scraping and cleaning the carious cavities and of the mode of employing them.[5]

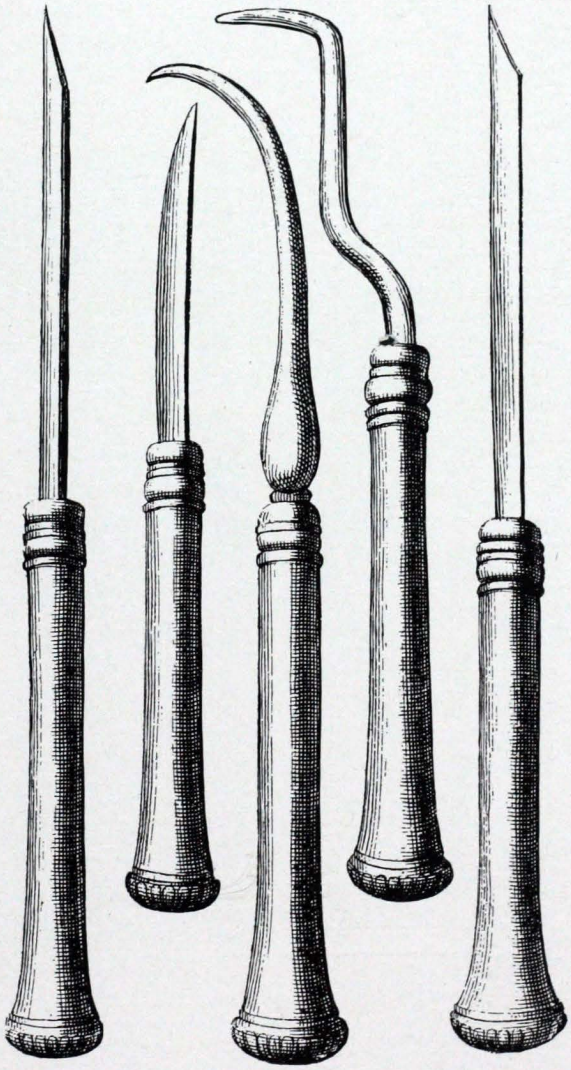
All of the above-named instruments are illustrated by figures, in contemplating which one cannot but reflect on the inferiority of the instruments then in use as compared with those of the present day. The greater

[1] Chap. xxxviii, p. 481. [2] Vol. ii, chap. ii. [3] Chap. iii. [4] Chap. iv. [5] Chap. v.

admiration is therefore due to Fauchard's talent, which, in spite of such imperfect and at times absolutely primitive means, enabled him to obtain the brilliant results cited in his observations.

Chapter VI is dedicated to the stopping of decayed teeth. The sole materials used by the author for stopping were lead, tin, and gold.

FIG. 79

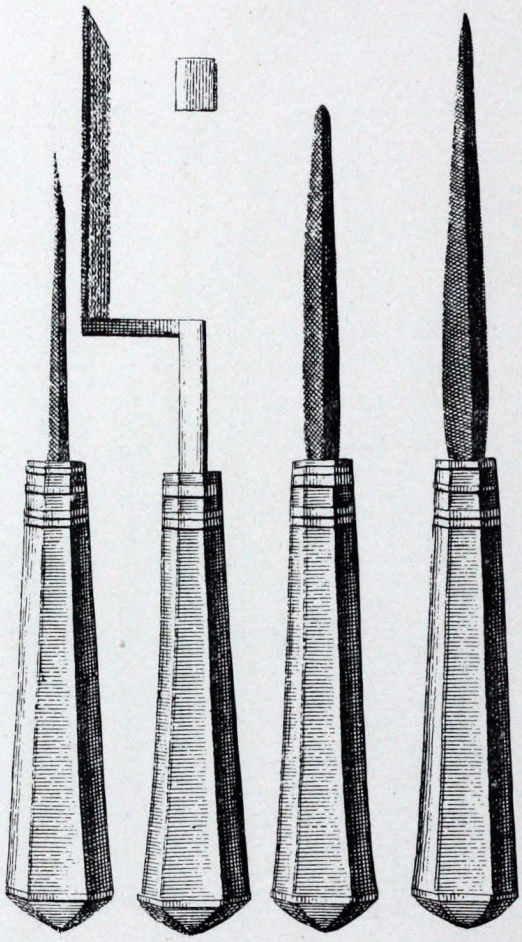


Instruments for detaching dental tartar (Fauchard).

"Fine tin," he says, "is preferable to lead, for lead turns black much more easily and is much less durable; both are preferable to gold, because lighter and adapting themselves better to the unevenness of the carious cavities. Besides, gold being dear, not everyone can or will make the corresponding outlay." The author here adds that those who, from

vanity or because possessed by the opinion that gold has special virtues, will not have their tooth stopped except with it, not unfrequently find dentists who, as the saying goes, content them and cozen them by using leaf tin or lead colored yellow, and making them pay for it as gold stopping!

FIG. 80



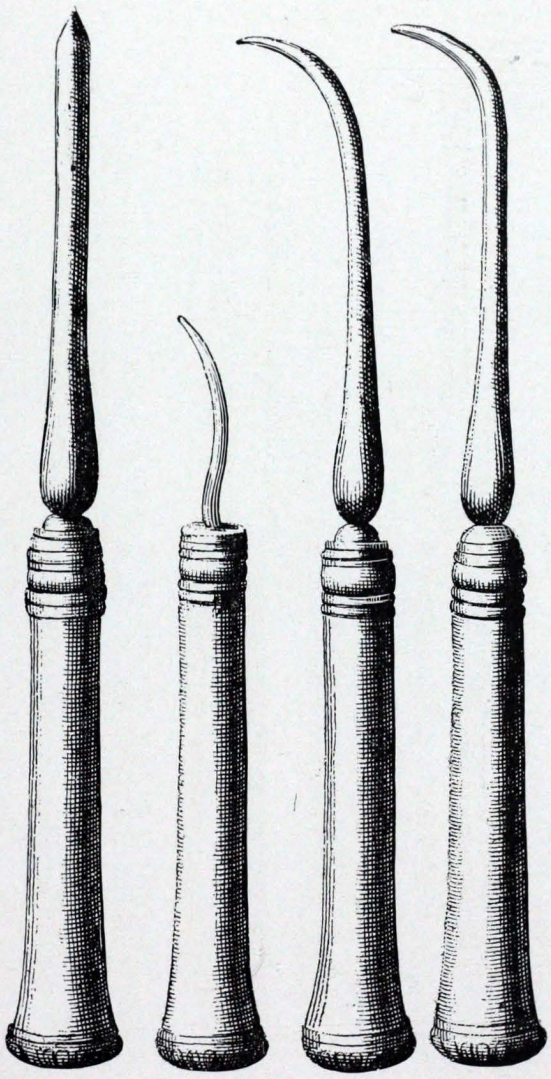
Some of the dental files used by Fauchard. The little square figure represents a small grooved wedge destined to be inserted in large interdental spaces, in order to give more firmness to the teeth to be filed.

The leaf metals were introduced and compressed into the carious cavities by means of three kinds of pluggers, which would nowadays be considered altogether insufficient and unfit for the purpose, but which then, nevertheless, served to produce excellent stoppings. The author speaks[1] of a lead stopping which had lasted in perfect condition for forty years.

[1] Vol. ii, p. 71.

Before stopping the tooth the cavity was scraped and its opening widened, if necessary, but no special form was given to the cavity itself, as is done at the present day.

FIG. 81



Instruments for scraping the carious cavities (Fauchard)

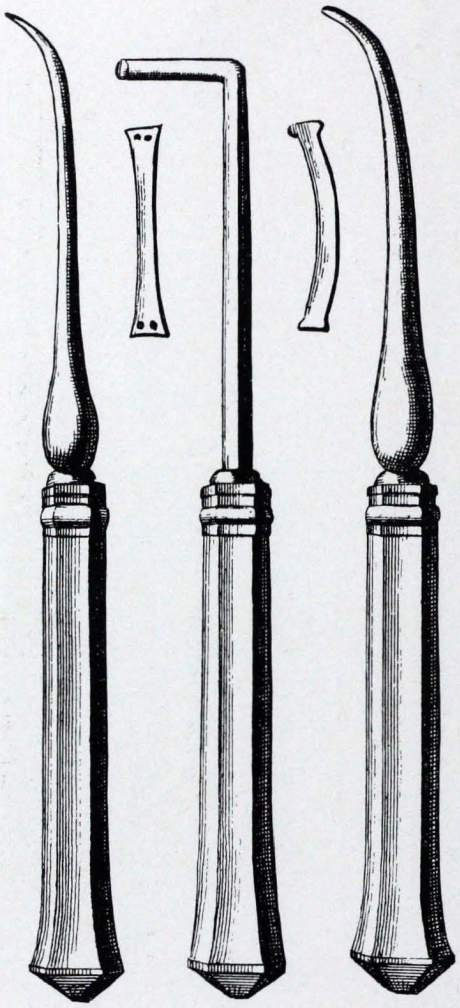
As at that time the state of the dental pulp was not taken into consideration before stopping a tooth, it often occurred that the stopping caused violent pain, which rendered its removal necessary.[1]

Fauchard says that "if the sensibility of the carious cavity be too great, the lead ought only to be pressed in very lightly at first, then after one or

[1] Vol. ii, p. 77.

two days a little more, continuing thus until it is properly compressed and fitted in, always provided, of course, that the pain does not increase. The sensitive parts of the tooth become thus more easily used to the pressure of the lead, and the pain is in this manner avoided or moderated."[1]

FIG. 82



Three instruments for plugging teeth. The two small figures represent silver plates for straightening teeth (Fauchard).

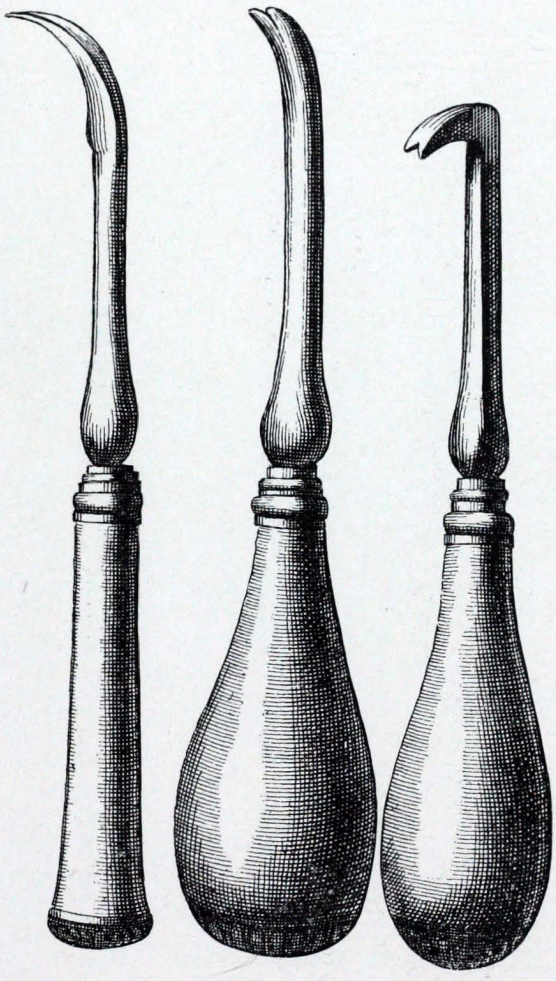
The author also makes the remark[2] that sometimes, in scraping a carious cavity, "it is not possible to avoid uncovering and touching the nerve with the instruments; one becomes aware of this by the pain caused, and better still by a little blood issuing from the dental vessels." In such

[1] Vol. ii, p. 78.

[2] Ibid.

cases, Fauchard advises stopping of the tooth immediately, for if it be carried out with delay, it is sure to be followed by inflammation and great pain, rendering necessary the removal of the lead or even the extraction of the tooth.

FIG. 83



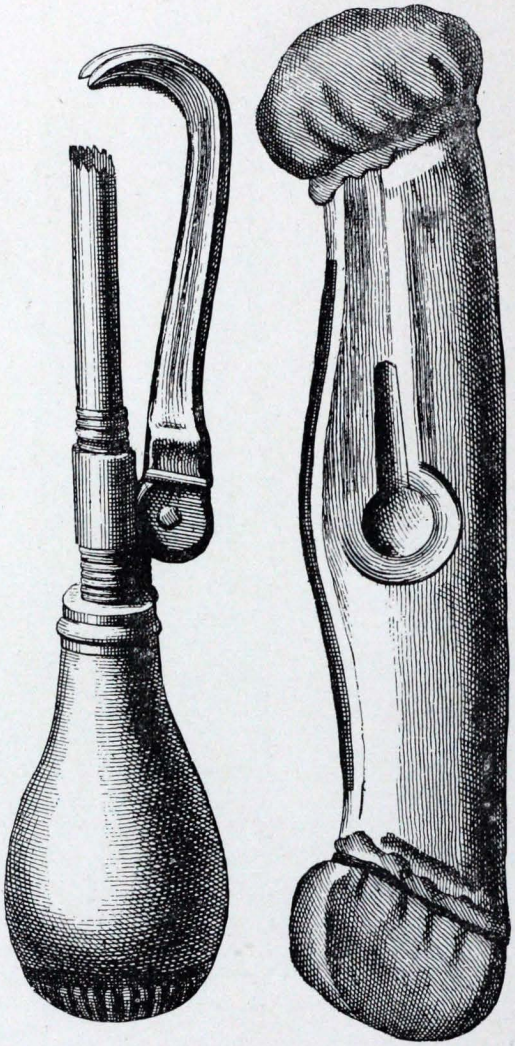
A gum lancet and two elevators, the second of which is destined to act from inside outward (Fauchard).

Cauterization of the teeth[1] continued to be much used in Fauchard's time, and this is very easily explainable when one considers that there was not then any other means of destroying the dental pulp. In making use of the actual cautery, the immediate end in view was to cause the cessation of obstinate toothache. "When the teeth give great pain and no relief is to be derived from the use of other remedies, one ought to cauterize the caries after having removed the extraneous substances that

[1] Chap. vii.

may eventually be found in the carious cavity. After the cauterization one scrapes the cavity and fills it up with cotton-wool soaked in oil of cinnamon. Later on one stops the tooth."[1]

FIG. 84



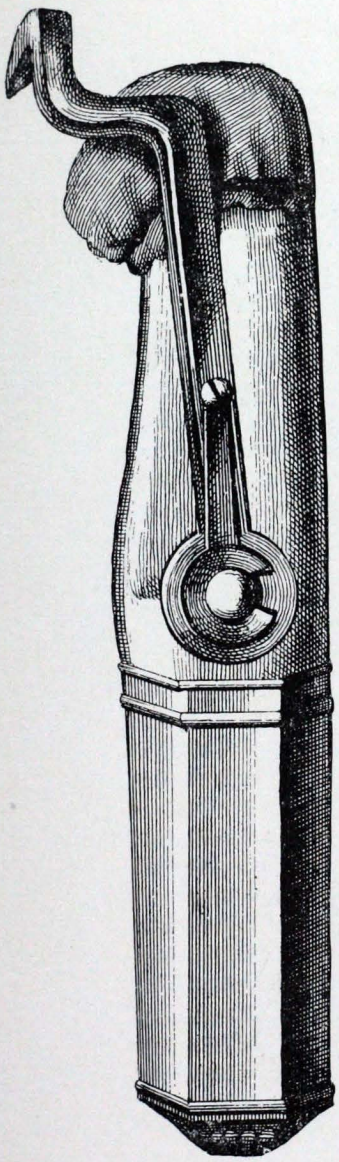
An extracting instrument called by Fauchard lever or tirtoire, and the handle of a pelican without the hooks.

The chapter in which Fauchard treats of the correction of dental irregularities is of particular interest. In speaking of his observations, we have already seen that in this field also he knew how to obtain splendid and admirable results. He, nevertheless, made use of the most simple

[1] Vol. ii, p. 80.

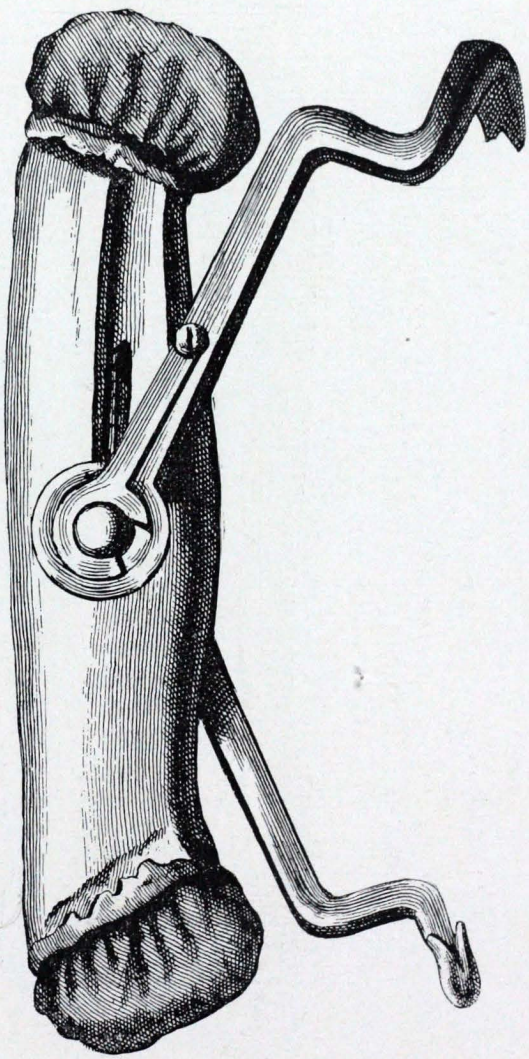
means—the file, pressure with the fingers, common threads or silk ones, little plates of silver or gold. At times, for straightening teeth, he made use of the pelican and the straight pincers, afterward tying the teeth in

FIG. 85



Fauchard's simple pelican (with one changeable hook).

FIG. 86



Fauchard's double pelican.

their normal position. He rarely had recourse to extraction as a means of carrying out dental corrections.[1]

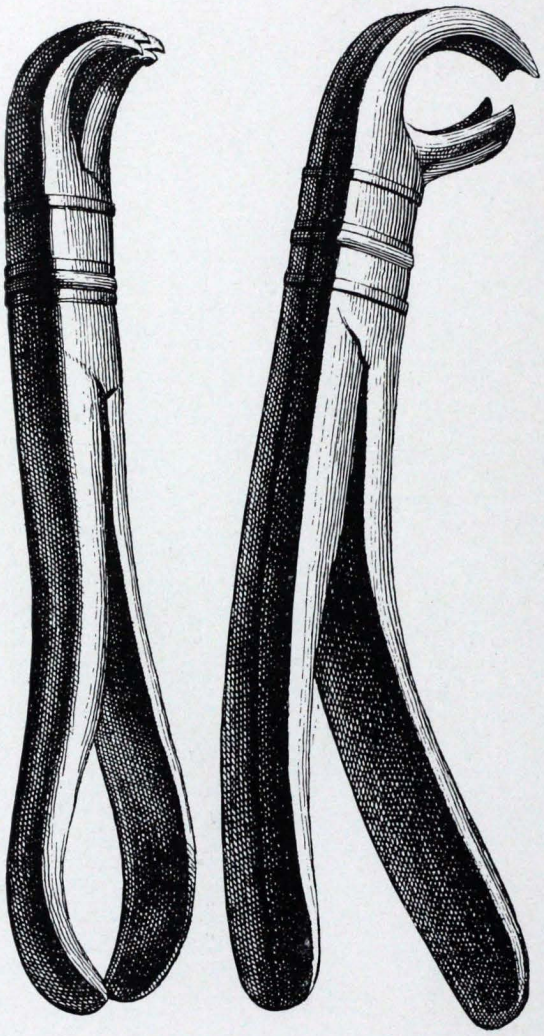
To steady loose teeth,[2] Fauchard, as did the ancients, made use of gold

[1] Vol. ii, chap. viii, p. 87.

[2] Chap. ix, p. 117.

threads. When the spaces separating a loose tooth from the neighboring ones were too large, he introduced small pieces of hippopotamus ivory into them of about the height of a line, and not exceeding the tooth itself in thickness; on each side of these was a vertical groove destined to serve as a support to the next tooth. Each of these pieces was furnished

FIG. 87



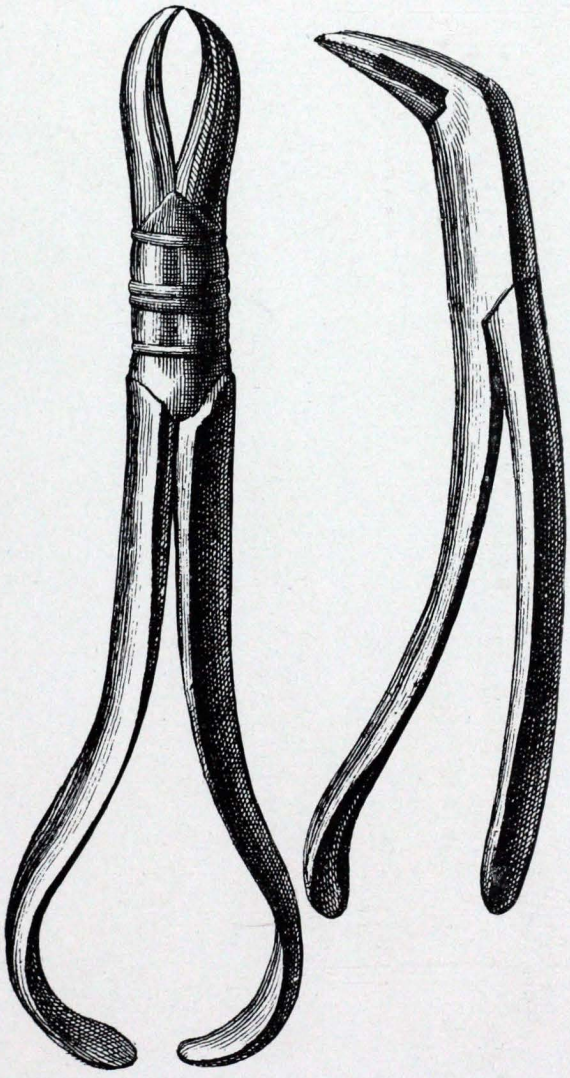
Dental forceps (Fauchard).

with two holes, through which were passed the gold threads which served to bind together the teeth and the piece of ivory itself. This latter was fixed close down to the gum.

Fauchard occupies himself in three different chapters (X, XI, XII) at great length with the extraction of teeth. He describes a pelican of

his own invention, and speaks of the advantages it presents over other pelicans previously in use. Notwithstanding this, it cannot be said that the instruments used by Fauchard for extracting teeth and roots show a sensible improvement on those in use before his time.

FIG. 88



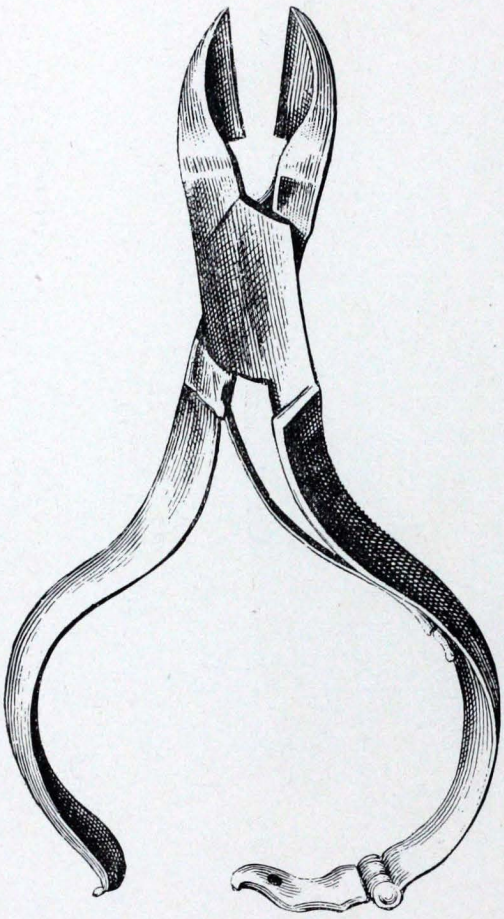
Straight forceps and crane's bill or crow's bill forceps (Fauchard).

Among the most usual operations, the author enumerates transplantation and especially replantation of the teeth.[1] Whenever, says Fauchard,

[1] Speaking of transplantation, he says: "On voit par des expériences journalières que des dents transplantées d'un alvéole dans l'alvéole d'une bouche différente se sont conservées plusieurs années fermes et solides sans recevoir acune altération, et servant à toutes les fonctions auxquelles les dents sont propres." (Vol. ii, p. 187.)

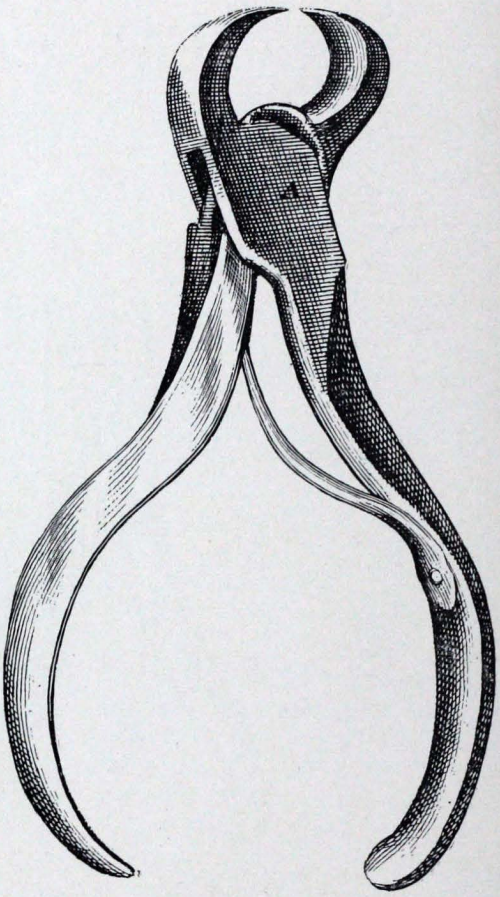
a wrong tooth is extracted by accident, it ought to be immediately replanted, and the same ought to be done when violent pain renders it necessary to extract a tooth that is not much decayed, as the patient is thus relieved without losing the tooth.[1] Fauchard adds that this operation succeeds excellently in the case of incisors and canines, and very often, too, with small molars.

FIG. 89



Cutting forceps (Fauchard).

FIG. 90



Cutting forceps (Fauchard).

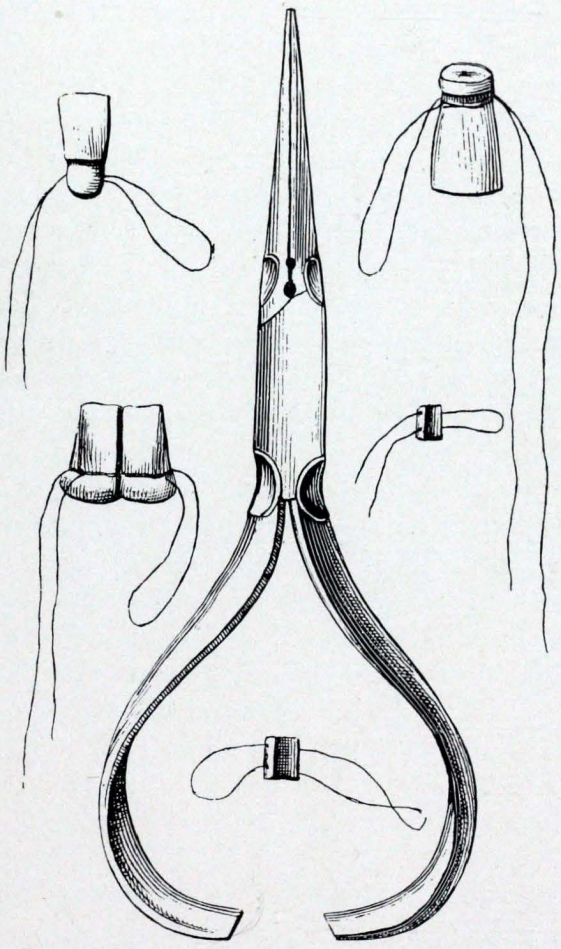
After having spoken of transplantation, he says:[2] "There is another mode of replacing human or natural teeth which I have never yet seen used except by a provincial dentist whose name I ignore." This special method consists in the transplantation of a tooth—it matters little whether recently extracted or not—after having made three or four notches in

[1] Page 188.

[2] Vol. ii, p. 192.

its root of about a line in depth. The author goes on to describe all the particularities of the operation, and then adds: "After twenty-five or thirty days one removes the thread, and the tooth is found to be firm in the alveolus, owing to the fact that this latter, exercising a pressure on the

FIG. 91



Pincers used by Fauchard in the operation of tying teeth with gold wire. The three larger figures represent natural or artificial teeth in which holes and horizontal grooves have been made in order to fix them with gold threads. The two smaller represent pieces of hippopotamus ivory with a vertical groove on each side, destined to fill large interdental spaces and to steady loose teeth by means of gold ligatures.

root on every side, becomes perfectly moulded upon it. In this manner, the tooth will remain mortised, and may be preserved for a considerable time."

This method, invented by an unknown provincial dentist, has been recently applied by Znamenski, of Moscow, for the implantation of artificial teeth made of porcelain, of caoutchouc, or gutta-percha.

One of Fauchard's greatest merits consists in the improvements introduced by him in dental prosthesis and in his having, besides, been the first to treat of this most important part of dental art in a clear and particularized manner.

The materials then most used in dental prosthesis were human teeth, hippopotamus tusks, ivory of the best quality, and ox-bone.[1]

The author minutely describes the methods to be followed to repair dental losses in every possible case and of whatever extent.

According to the circumstances, Fauchard used, for maintaining artificial teeth in their place, linen, silk, or gold thread, passed through holes made in them, and tied to the natural teeth.

When a set of two, three, four, or more teeth was to be applied, Fauchard first prepared them separately and then united them together by means of one or two threads of gold or silver in such a manner that the set formed at last a single piece, which was then fixed to the natural teeth. When the piece consisted of several teeth it was reinforced with a small plate of gold or silver fixed to its inside by means of small tacks of the same metal riveted on one side to the plate, on the other to the front part of each tooth.

The author remarks that a similar prosthetic piece lasted longer than those previously described, but required proportionately much more work and much greater expense. He adds that, by employing this plate, one can even dispense with threading and fixing the teeth together with gold or silver wire; but that it was then necessary to make a horizontal groove at the back of each tooth corresponding to the width and thickness of the plate, which could be fitted into the serial groove and fixed to each single tooth by means of two small rivets.[2]

At other times the prosthesis was carried out in a single piece of material (ivory, hippopotamus tusk, etc.) that was carved in such a manner as to substitute exactly the teeth wanting, it being fixed to the natural teeth in the usual manner.

Fauchard sometimes left the dental roots in their place (if they were in good condition), applying upon them artificial crowns, which he either bound to the neighboring teeth or fixed with screws to the respective roots.

"When one wishes to apply an artificial crown to the root of a natural tooth, one files away the part of the root that emerges above the gum, and even more if possible. One then removes, with proper instruments, all that is decayed in the root itself; after which one stops the root canal with lead and fits the base of the artificial tooth to the root in such a manner that they correspond perfectly to each other. One drills one or two holes in the tooth through which to pass the ends of a thread, which serves to fasten it to the natural teeth on each side of it, as described above.

[1] Vol. ii, chap. xiii, p. 215.

[2] Vol. ii, pp. 217 to 224.

"If the root canal has been very considerably enlarged by the carious process, so as to have rendered it necessary to stop it, the root being, nevertheless, still quite steady, one bores a small hole in the lead as deep and as straight as possible, without, however, penetrating farther down than the root canal. The artificial crown is then united to the root by a pivot in the manner I shall now describe."[1]

The method of applying pivot teeth is described with great accuracy. In it the author considers all the different circumstances that may present themselves, and says, among other things, that if the root is still sensitive to pain, one should apply the actual cautery inside the canal, before fitting the artificial crown to the root. For fixing the pivot inside the artificial crown (which was generally the crown of a human tooth), Fauchard used a special cement made with gum lac, Venetian turpentine, and powdered white coral.[2]

In the case of there not being any whole teeth to which the prosthetic piece would be fixed, but only roots, Fauchard made two holes in it in perfect correspondence with the canals of two roots, and fixed the prosthetic piece to these by means of two pyramidal screws.[3]

This method suggests in a certain way the idea of bridge-work.

In Chapters XVII, XVIII, XXIV, and XXV, Fauchard describes various methods for the application of entire sets of false teeth, both upper and lower, as well as double.

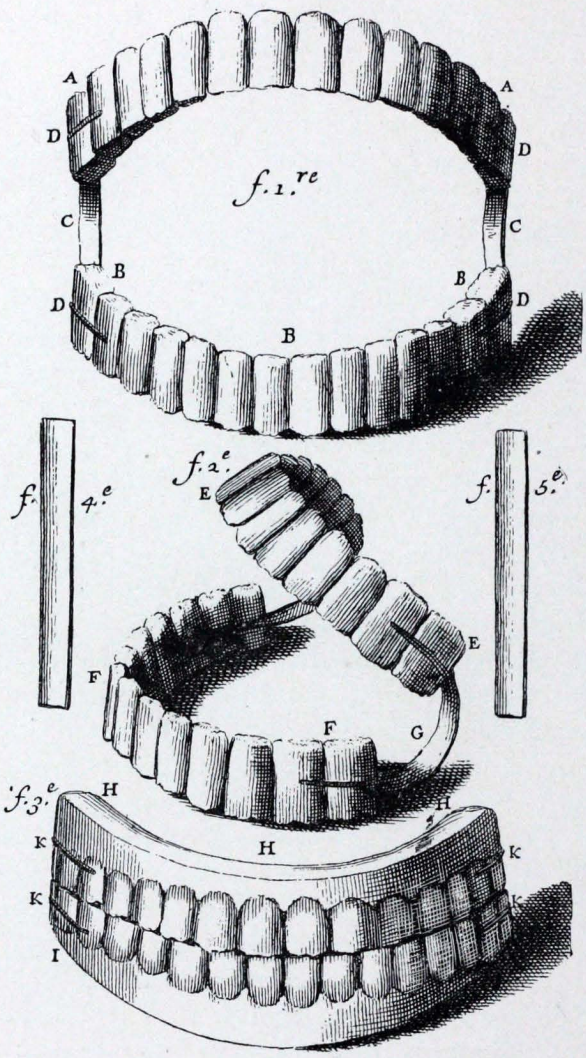
The author says that if the lower jaw is entirely toothless, a set of teeth can be adapted thereto without the need of any special contrivance; however, it is necessary that the prosthetic piece should fit perfectly, so that the configuration of the maxillary arch and the irregularities of the gum, finding themselves in complete correspondence with the piece itself, may keep it steady in its place. The support offered by the tongue interiorly, by the cheeks and the under lip exteriorly, contributes to keep the artificial set steady; one can thus masticate as easily with it as with one's own teeth, especially if the teeth of the upper jaw be still existing and the individual be already sufficiently used to the wearing of it.[4]

With regard to the application of an entire set of upper teeth, one learns from Fauchard that although some attempt had been made in this direction before this time, the results had been very unsatisfactory. He relates that: "In 1737 a lady of high rank, of about the age of sixty, who had not lost any of her lower teeth, but was deprived entirely of the upper ones, applied to M. Caperon, dentist to the King, who was most able in his profession, in the hope that he might be able to furnish her mouth with an upper set. But he said that, no tooth whatever being left in

[1] Vol. ii, p. 225.
[2] Vol. ii, p. 229.
[3] Chap. xvi, pp. 252, 255.
[4] Vol. ii, chap. xvii, p. 260.

existence, every possible point of attachment was wanting, and it would therefore be as difficult to do this as it would be to build in the air."[1] He, however, directed the lady to Fauchard, who asked for a few days to think the matter over, and succeeded in devising a means of applying an

FIG. 92



Complete dentures (Fauchard). *f.* 3 represents an enamelled denture with artificial gums; *f.* 4 and *f.* 5, steel springs.

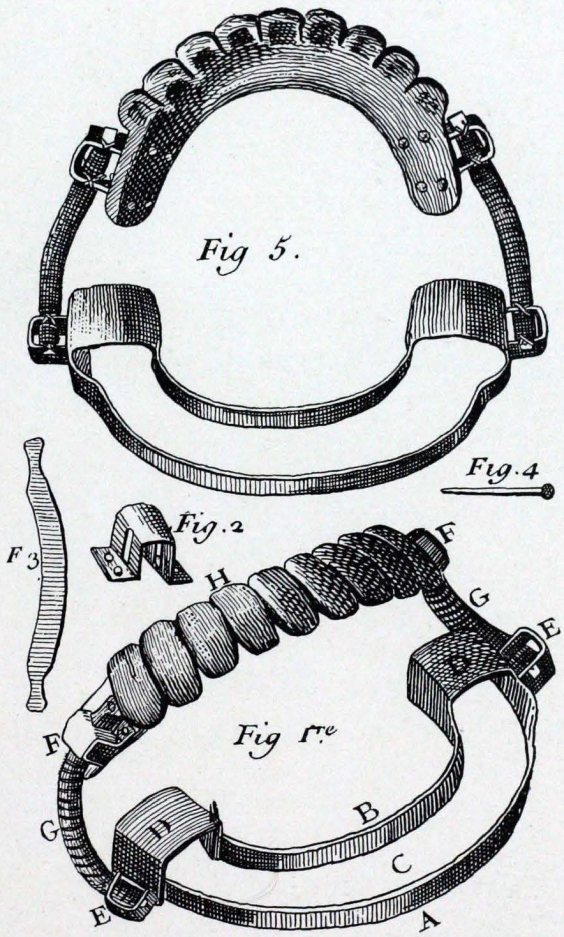
upper set of teeth, which, in fact, entirely satisfied the wishes and wants of the client. "As this lady," says the author, "simply wished to have the front of her mouth decorated, and to be able to pronounce more perfectly,

[1] Vol. ii, chap. xxiv, p. 339.

I gave less extension to the set. The lady eats easily with it and could not now do without it. For greater convenience she has two similar sets, which she uses alternately."[1]

The author describes with great minuteness the manner in which the prosthetic apparatus in question was constructed and supported, and then

FIG. 93



An upper denture supported by springs fixed to a gold appliance which embraces the natural teeth of the lower jaw (Fauchard).

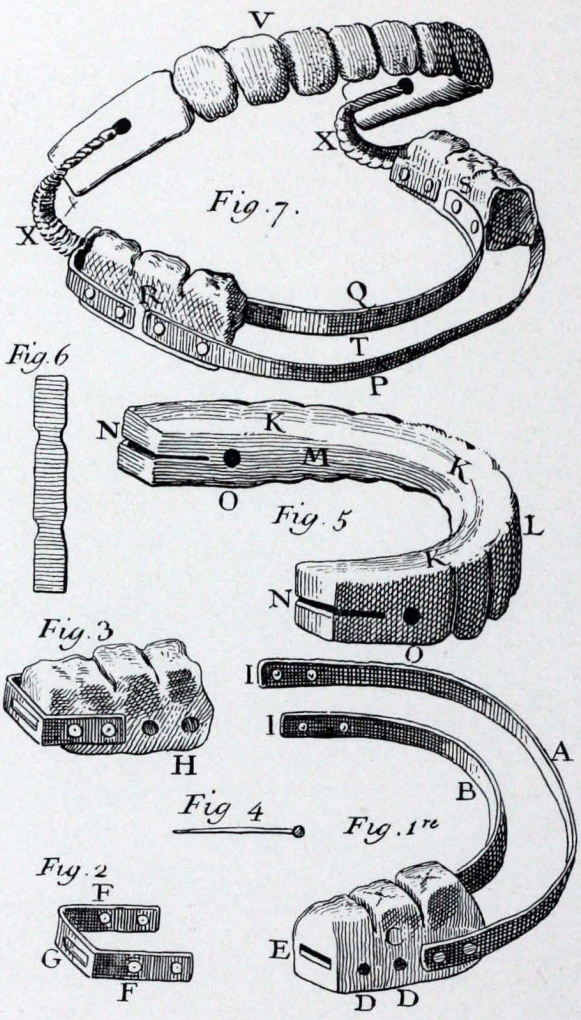
speaks of the successive improvements introduced by him into this most important part of prosthetic dentistry, particularly in what regards the springs destined for the support of the upper set of teeth.

Fauchard also relates having made an attempt to apply an upper set of teeth without the aid of springs, which proved successful in three cases. "One can," says he, "adopt an entire set of teeth to the upper jaw, of

[1] Vol. ii, p. 340.

much greater simplicity than those described, and which is maintained in its place by the sole support of the cheeks and the lower teeth. It must be very light indeed and serves almost solely to improve the appearance and the pronunciation; but when the individual gets used to it, he can also masticate with it. A set of teeth of this kind ought to adhere well to the

FIG. 94



A spring denture for a case in which the lower front teeth still exist. Figs. 1 to 6, various parts of the apparatus (Fauchard).

gums and to be constructed in such a manner that the cheeks may afford it sufficient pressure and support together with the aid of the lower teeth; these latter sometimes bring it back into its place, without anyone perceiving the movement except the wearer himself. Not long since I had to renovate a set of teeth of this kind made by me more than twenty-

four years ago, and worn by the owner to the greatest advantage. I have since made two others which have proved most useful to the persons wearing them. It is true that there are few mouths adapted for wearing these sets, so much so that, excepting the three referred to, I have never made any others. To be able to construct similar sets successfully, the dentist must be possessed of skill and ingenuity. Apart from this, they are the most suitable for persons who cannot spend much, as they cost less to make."[1]

Fauchard did not merely content himself with having perfected dental prosthesis in the manner alluded to; he also succeeded in giving a quite natural appearance to artificial teeth. To reach this end he placed the art of the enameller under contribution to the dental art. Thus he had artificial pieces covered over with enamel, imparting to them the hue that seemed to him best adapted, and also imitating admirably the natural color of the gums, so as to render the illusion perfect. The pieces to be enamelled were worked by special rules, which are minutely given in Chapter XIX of the second volume of his book.

Fauchard also brought the palatine prosthesis to a high degree of perfection. He describes five different obturators of the palate, which of themselves alone would be sufficient to testify to the highly inventive genius of the author, although they are defective in being somewhat too complicated. Some of these fixtures are a combination of a dental set and palatine obturator.

We ought now to mention, in the order of chronology, some authors of lesser importance.

Vasse and De Diest wrote about the danger of fatal hemorrhage following on dental operations.[2] They report a few cases of this kind, giving the blame of these accidents, however, to the carelessness of the operator.

Lavini published in Florence, in the year 1740, a very good treatise on dentistry (*Trattato sopra la qualità de' denti, col modo di cavarli, mantenerli e fortificarli*), which, however, marks no advance on the work of Fauchard.

M. Bunon (died 1749), a French dentist, wrote four admirable works on dentistry, which were published from 1741 to 1744. We will here briefly allude to the most salient ideas therein contained.

This author combated strenuously some prejudices then generally diffused; such as that of its not being advisable to extract teeth during pregnancy, and that of the extraction of an upper canine (eye tooth) being

[1] Vol. ii, p. 353.

[2] Jean de Diest, An hæmorrhage ex dentium evulsione chirurgi incuria lethalis? Paris, 1735. David Vasse, Hæmorrhagia ex dentium evulsione, chirurgi incuria lethalis, Paris, 1735.

attended with great danger. He demonstrated the absurdity of the latter idea by putting in evidence the anatomical fact that the upper canines are innervated by the infraorbital nerve, which does not stand in any relation whatever to the organ of sight.[1]

Among the other remedies recommended by him against the disorders and perils of first dentition, there is one most curious, not to say ridiculous: he advises rubbing the nape of the neck, the shoulders, the back, and the lower limbs of the child, but in doing this the friction should proceed from above downward, in order to offer resistance to the flow of humors toward the upper parts of the body. The utility and efficacy of this kind of massage in favoring the process of dentition seems, of a truth, very open to question.

Bunon speaks at length of *erosion of the teeth*, and declares himself to be the discoverer of this disease, which destroys the enamel of the teeth already before their eruption. The first molars, the canines, and the incisors are much more frequently damaged and affected by it than the other teeth. According to Bunon, it is generally due to measles, smallpox, malignant fevers, or scurvy, when children are subject to these maladies during dentition, and more especially during the first. He is of the opinion that erosion not only generates caries, but may be considered as being the origin of the greater part of dental affections.

This author distinguishes three principal kinds of dental tartar, the black, the pale yellow, and the brownish yellow; he admits, however, two other kinds that are less frequent, that is, the red tartar and the green.

He relates having observed in the jaw of a child, who died at the age of three years and a half, a splintering of the alveolar parietes in all directions, and attributes this phenomena to disproportion between the size of the teeth and the alveoli. On the basis of his anatomical observations, he says that caries only appears on teeth that have already come out of the gums, whilst erosion is produced in teeth not yet erupted, indeed, at times, several years previous to their eruption.

We will also mention, by way of a curiosity, Bunon's proposal to substitute the word legs for that of dental roots.[2]

Fr. A. Geraudly, a French dentist, wrote (1737) an excellent treatise on dental maladies and on the mode of preserving the teeth. His book, which was also translated into German,[3] contributed to the diffusion of knowledge relative to dental prophylaxis and therapeutics, but apart from this brought no increment to the progress of practical dentistry. Some

[1] M. Bunon, Sur un prejugé très-pernicieux, concernant les maux de dents qui surviennent aux femmes grosses, Paris, 1741.

[2] M. Bunon, Essai sur les maladies des dents, Paris, 1743. Expériences et démonstrations pour servir de suite et de preuves à l'essai sur les maladies des dents, Paris, 1746.

[3] Abhandlung von Zahnkrankheiten, etc., Strassburg, 1754.

of the ideas of the author, however, merit consideration. He clearly expresses the opinion that the shedding of the milk teeth is brought about by the pressure exercised upon them by the germs of the permanent teeth in course of development. The loss of the teeth in young subjects, or in those who have not yet reached forty years of age, is explained by the author in an altogether special manner. He relates that Louis XIV, at the age of thirty-five, had lost all his upper teeth, and the considerations he makes on the subject bring him to the conclusion that the precocious loss of the upper teeth depends in many cases on a paralysis of the nervous fibers that go to them, which paralysis is probably caused by a dissolute and intemperate life, having as its consequence the weakening of the organism and, above all, of the nervous system. Without doubt there is some truth in Gerauldy's ideas, it being well known that the falling of the teeth (as well as of the nails and the hair) often depends on nutritive disorders deriving from nervous disturbances. We have the clear proof of this in certain cases of tabes dorsalis accompanied by the spontaneous falling of the teeth and nails.

Joseph Hurlock, an Englishman, published a treatise in 1742,[1] in which he warmly recommends lancing the gums in cases of difficult dentition; he declares this to be entirely without danger, and affirms that it constitutes the sole means of salvation for not a few infants who without it would die of convulsions.

Mouton, in 1746, that is, in the same year in which the second edition of Fauchard's work was issued, gave to the light a monograph, the first extant, on mechanical dentistry.[2] The methods of this author for the most part do not differ from those of Fauchard, nevertheless one finds several important innovations in his work. To prevent the further deterioration of teeth already much destroyed, and to preserve them some time longer, Mouton had recourse to the application of "calottes d'or," that is, gold crowns. He used this for the front teeth as well as for the molars, but in the former case he had them enamelled to give them the same appearance as natural teeth.

Mouton also invented a new method of applying artificial teeth. Up to then the ordinary method had been that of fixing them to the natural teeth by means of threads passed through holes made in the artificial teeth expressly for that purpose. Mouton is the first to speak of artificial teeth fixed to the natural teeth adjoining them by means of springs or clasps.

This author relates having carried out several transplantations with perfect success, a thing that contributed greatly to his renown not only in France, but also in England. He distinguished himself, besides, by the

[1] A Practical Treatise upon Dentition or the Breeding of the Teeth in Children.

[2] Essai d'Odontotechnique, ou Dissertation sur les Dents Artificielles.

correction of dental irregularities. Lastly, it is to be noted that this author frequently had recourse, as a remedy against toothache, to the stretching of the dental nerve by means of moving and partially raising the tooth (subluxation).

A. WESTPHAL. In proof of the great utility of lancing the gums in cases of difficult dentition, A. Westphal reports a case in which the difficult eruption of an upper canine tooth provoked considerable inflammation and protrusion of the eye on the same side as the tooth; these symptoms promptly disappeared, however, as soon as the gum was lanced down to the tooth itself.[1]

J. BERTIN also declares himself in favor of this operation; he recommends never to neglect it in cases of difficult dentition, and to make the said incisions deep and wide enough.[2]

L. H. RUNGE, a surgeon of Bremen, published, in 1750, a monograph on the diseases of the frontal and maxillary sinuses. He says that in cases of inflammation of Highmore's antrum, the pus may make its way, corroding the bone, as far as the alveoli, or, sometimes, as far as the orbital cavity; and, *vice versa*, alveolar suppuration can give rise, by diffusion, to abscess of the maxillary sinus. In this latter, tumors of various kinds may form (polypi, cysts, sarcomas, cancers, exostosis), the existence of which is ignored at first, and only becomes manifest tardily. Runge's father, who was also a surgeon, had occasion to observe, and to treat an important case of disease of the maxillary sinus, with considerable dilatation of the same, not only on the side of the cheek, but also on the side of the palate and of the nasal fossæ. With a strong scalpel he perforated the outer wall of the antrum above the molars (keeping the cheek detached) and enlarged the aperture by making the instrument turn around on its own axis, thus giving exit to a considerable quantity of non-purulent liquid. Detersive and aromatic injections were used for some time. The canine tooth, situated obliquely, having been extracted, its alveolus was found to communicate with the antrum. From this moment, the injections being continued, a rapid improvement was obtained and the patient was so completely cured that no deformity of the face remained.

Runge relates a case in which, having extracted a canine tooth, he found a cyst adhering to its root. From this he is induced to believe that in the case related above the disorder was also to be attributed to a large cyst having its origin in the root of the canine.

According to him, the ozena always stands in relation to a suppurative affection of the maxillary sinus, and for its treatment one must, therefore, have recourse to Drake's operations.[3]

[1] Sprengel, Part ii, p, 319. [2] Journal de Médecine, 1756.
[3] L. H. Runge. De Morbis sinuum ossis frontis, maxillæ superioris, etc., Rintel, 1750.

GEORG HEURMANN, a surgeon in Copenhagen, recommends making use, after the Cowper-Drake operation, of a small cannula in order to facilitate the exit of the pathological material contained in the sinus, and also to render it easier to introduce into it medicated or detersive substances.[1]

LÉCLUSE. One of the most celebrated French dentists of the eighteenth century is Lécluse. Dental literature was enriched by him with several works, partly written in popular style, partly addressed to dental specialists. In 1750 he published his *Traité utile au public, où l'on enseigne la méthode de remédier aux douleurs et aux accidents qui précèdent et qui accompagnent la sortie des premières dents, de procurer un arrangement aux secondes, enfin de les entretenir et de les conserver pendant le cours de la vie.* The work seems to have been very favorably received, as its first edition, printed in Nancy, was followed by a second, printed in Paris, only four years later. In 1755 he published another book: *Eclaircissements essentiels pour parvenir à préserver les dents de la carie et le conserver jusqu'à l'extrême vieillesse.* But the most important of his works is the *Nouveaux éléments d'odontologie*,[2] the first edition of which was published in 1754, and followed by a second in 1782.

We do not enter into a minute examination of these works, which, taken altogether, do not contain anything very new. We will only remark that Lécluse treated in a succinct but correct manner the anatomy of the mouth; invented some and perfected other instruments, the most important of which is the elevator that still bears his name, and finally, that he frequently performed the operation of replantation, warmly recommended by him as an excellent means of cure in certain cases of caries. The extracted tooth was stopped and afterward replanted, and, says Lécluse, became fast within eight days, proving as serviceable as a perfectly healthy tooth, and never again causing any pain.

PHILIP PFAFF, dentist to Frederick the Great, King of Prussia, was the first among the Germans who wrote a real treatise on dentistry. His book[3] contains, in 184 succinctly but well-written pages, the anatomical and physiological notions relative to the teeth, as well as all that belongs to dental pathology, therapy, and prosthesis.

Besides a few observations about supernumerary teeth, Pfaff relates several cases in which the incisors, inferior as well as superior, were renewed (twice consecutively), that is, once at the usual epoch, and the

[1] Sprengel, Part ii (?), p. 322.

[2] Nouveau éléments d'Odontologie, contenant l'anatomie de la bouche, ou la description de toutes les parties qui la composent, et de leur usage; et la pratique abregée du dentiste, avec plusieurs observations, par M. Lécluse, Chirurgien dentiste de Sa Majesté le Roi de Pologne, etc., Paris, 1754 (vol. in 12mo of pages viii–222 with six plates).

[3] Abhandlung von den Zähnen des menschlichen Körpers und deren Krankheiten, 1756.

second time between the seventh and thirteenth years. He also cites from the anatomical tables of Kulmus the following epitaph in low Latin, that seems to allude to a case of third dentition:

"Decanus in Kirchberg, sine dente canus, ut anus
Interum dentescit, ter juvenescit, hic requiescit."

In cases of hemorrhage ensuing on the extraction of teeth, the best hemostatic, according to Pfaff, is essence of turpentine, a remedy which in these cases he had always found efficient. He introduced a little ball of lint bathed in this essence as deeply as possible into the alveolus, applying upon it some blotting paper reduced to pulp or some dry lint that the patient compressed tightly by closing his teeth.

Gingival abscesses as well as fistulæ of the maxillary region almost always owe their origin, says Pfaff, to decayed teeth, and can, therefore, in general, not be cured except by the extraction of these teeth.

The prosthetic methods described by this author are, for the most part, identical with those of Fauchard and the other French dentists already mentioned. As to the materials used for prosthesis at different periods, Pfaff mentions, besides ivory, bone, hippopotamus tusk, teeth of sea cow, and human teeth, also teeth made of silver, of mother of pearl, and even of copper enamelled.

The chief merit one must concede to Philip Pfaff is that of having been the first to make use of plaster models. It is, therefore, to two Germans —Pfaff and Purmann, the latter who, as we have already seen, used wax models—that one of the greatest progressive movements in dental prosthesis is indebted, that is, the method of taking casts and making models, of which method one finds no trace whatever in the authors of antiquity, and which, it would appear, was not known even to Fauchard himself. The wax casts of an entire jaw were taken by Pfaff in two pieces, one of the right half of the jaw, and the other of the left; which were then reunited, and one thus avoided spoiling the cast in removing it from the mouth.

Another great merit of Philip Pfaff is that of having first carried out the capping of an exposed dental pulp, previous to stopping a tooth.

Notwithstanding this, Pfaff is not the first who, as Geist-Jacobi is inclined to believe,[1] *had dared to apply a filling over an exposed dental pulp without first cauterizing it.* As we have already seen, Fauchard did not hesitate in the least to fill a tooth when the dental pulp had become exposed in scraping the carious cavity. But the French dentist carried out, with much delicacy, a simple filling, whilst Pfaff first capped the dental nerve.

Jacob Christian Schaffer. In 1757 the evangelical pastor, J. Ch. Schaffer (we do not know if he was at the same time a dentist, or merely an

[1] Geist-Jacobi, p. 164.

amateur in odontology), wrote a little book[1] to disprove the existence of worms in decayed teeth, and to show the fallacy of believing that the

[1] Die eingebildeten würmer in Zähnen, Regenburg, 1757.

[Schaffer's publication is of considerable interest in that his illustration here reproduced exhibits one of the devices somewhat generally employed for the eradication of dental worms as a cure for toothache. In the title of his work Schaffer describes himself as Protestant preacher at Regensburg, member of the Royal Society of Fine Arts at Göttingen, of the Royal Society of Science at Duisberg, honorary member of the Fine Arts at Leipsic.

The several details of the plate are designated as follows:

Fig. I. The supposed worms, with single and double tails, or actually seed buds of the henbane driven out by heat, natural size.

Fig. II. Kidney-shaped seed of the henbane, natural size, without seed buds.

Fig. III. Another such seed, natural size, with the pith being driven out in bow-shape.

Figs. IV and V. Slightly magnified supposed entrails of the tooth worms, actually the inner basis substance for the development of the seed lobes.

Fig. VI. Portion of the skin and driven out supposed entrails of the tooth worms, strongly magnified: (*aa*) skin still attached; (*b*) supposed entrails.

Fig. VII. Seed same as Fig. II, magnified: (*a*) external pellicle; (*b*) seed bud.

Fig. VIII. Seed of Fig. III, magnified: (*aa*) external pellicle; (*b*) node; (*c*) seed bud driven out in bow-shape.

Figs. IX, X, and XI. Three kinds of supposed tooth worms, magnified; the lettering corresponds in all three: (*a*) head; (*b*) brown spot or mouth; (*c*) body; (*d*) apparent opening or anus; (*ee*) single or double tail; (*ff*) brown spot of the tail; also an apparent opening.

Fig. XII. Representation of the utensils and the mode in which they are arranged during the application of the supposed remedy against tooth worms: (*a*) earthen pot; (*b*) opening visible on one side; (*c*) opening in the bottom; (*dd*) iron passing through the two side openings, on which the wax balls (containing henbane seeds) are laid inside the pot; (*e*) smoke arising through the opening in the top, which is directed into the mouth; (*ff*) bowl of water in which the pot is set, into which the supposed worms fall and in which they are found after the cure.

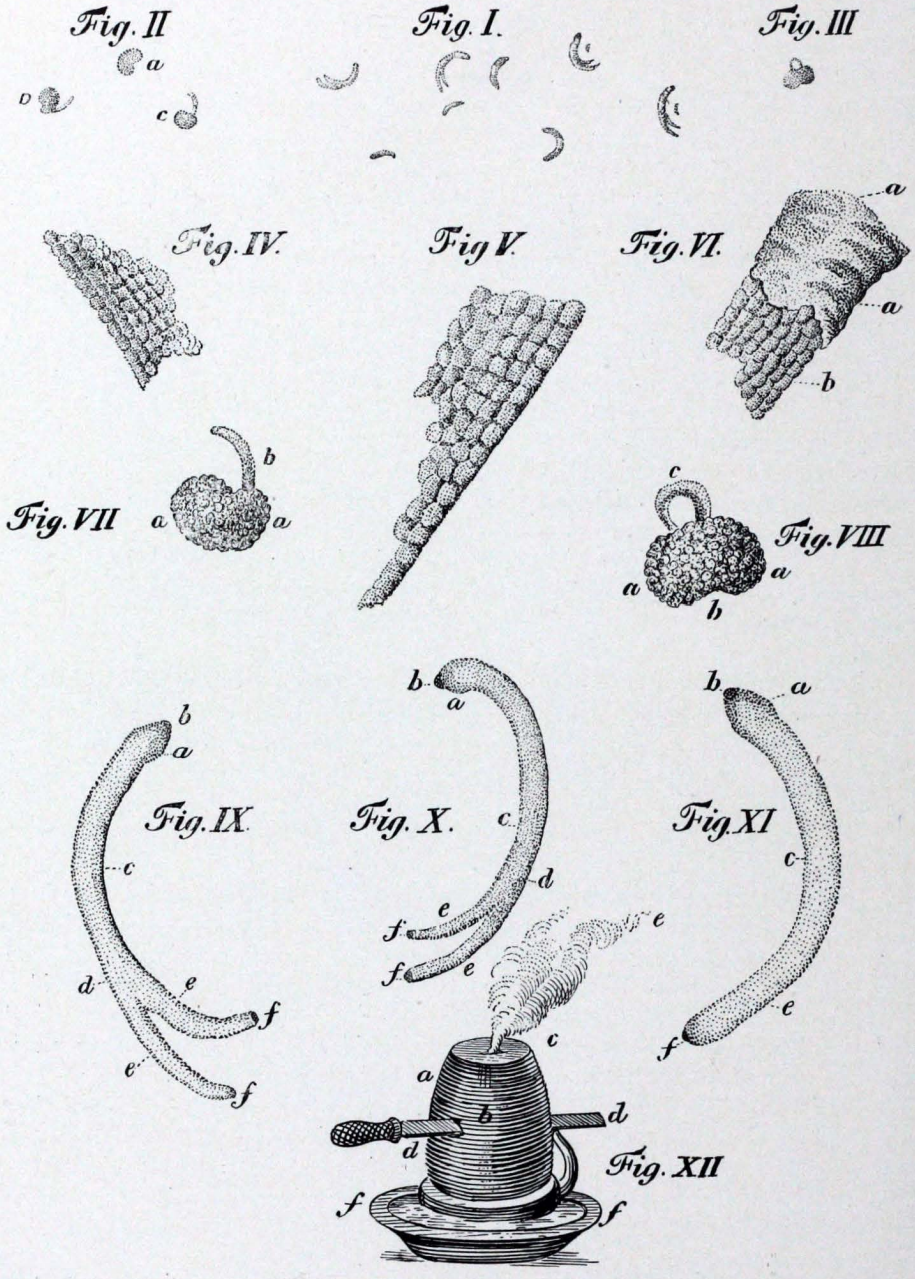
It would seem not at all improbable that the inhalation of vapors arising from heated henbane seeds might in some cases, *e. g.*, of odontalgia from pulpitis, produce a sedative effect by the action of the hyoscyamine given off. Assuming that the method possessed even a slight therapeutic value, that factor in connection with the apparently tangible evidence of the existence of tooth worms which it afforded to the ignorant, makes the method a most interesting example of the way in which superstition and ignorance about medical matters are kept alive and sustained by a very slight increment of truth.

Another interesting reference to the use of henbane seeds for the cure of toothache by fumigation as found in an old Saxon manuscript of the ninth or tenth century, a translation of which is published in Leechdoms, Worthcunning, and Starcraft of Early England, vol. ii, p. 51, a collection of documents illustrating the history of science in England before the Norman conquest, published under direction of the Master of the Rolls. The reference is as follows:

" For tooth wark, if a worm eat *the tooth*, take an old holly leaf and one of the lower umbels of hartwort and the upward *part* of sage, boil two doles (that is, two of worts to one of water) in water, pour into a bowl and yawn over it, then the worms shall fall into

supposed worms may be made to drop out by means of fumigations of henbane seeds. His book appeared, as a matter of fact, rather behind-

the bowl. If a worm eat the teeth, take holly rind over a year old, and root of Carline thistle, boil in so hot *water!* Hold in the mouth as hot as thou hottest may. For tooth



worms, take acorn meal and henbane seed and wax, of all equally much, mingle *these* together, work into a wax candle and burn it, let it reek into the mouth, put a black cloth under, then will the worms fall on it."—E. C. K.]

hand, for in it Schaffer repeats in substance what Houllier had already said two centuries earlier, and after him various other authors, including Fauchard. At any rate, to coöperate in the complete destruction of error and in the diffusion of truth is always laudable. We feel, however, bound to add that in the very same year in which Schaffer's pamphlet was published, DUFOUR, a Frenchman, described a worm that had been taken out of a decayed tooth, and called attention to the fact that it was altogether different from the "dental worms" described by Andry.[1]

BOURDET. An excellent book on dentistry[2] appeared in France in the year 1757, the work of Bourdet, a celebrated dentist and elegant writer, in whom the gifts of literary and scientific culture were coupled with a vast experience and a profound spirit of observation. His merits procured him the honor of being appointed dentist to the King.

This author condemns as harmful the use of hard substances (such as bone rings, etc.) that people are in the habit of putting into children's hands during the period of the first dentition, in the idea that by pressing these objects between the gums, as children instinctively do, they cut their teeth more easily. As to emollients, he holds them to be completely useless, and prefers to all these remedies the use of lemon juice.

According to Bourdet, the teeth are so apt to decay, partly because of the frequent changes of temperature to which they are exposed, and partly because, differently from the bones, they are not provided with any protective organic covering.

In many cases of caries, Bourdet extracted the tooth, filled it with lead or gold leaf, and replanted it; but if, in extracting, the alveolus had been somewhat injured (a thing very likely to happen with the instruments of the period), he replanted the tooth immediately, to preserve the alveolus from the damaging action of the air, and carried out the stopping at a later time.

Even in certain cases of violent toothache not depending on caries, Bourdet luxated the tooth and replaced it in position directly. But as some dentists had accused him of having passed off as new an operation already made known by Mouton since the year 1746, Bourdet defended himself by saying that whilst Mouton only shook the tooth, raising it a little, simply to distend the nerve, he, instead, effected a complete luxation, in order altogether to interrupt the continuity of the nerve. Anyhow, this operation was not new, as it had already been recommended and practised by Peter Foreest, in the sixteenth century, and in an even more remote epoch by the Arabian surgeon Abulcasis.

[1] Recueil périodique d'observations de Médecine, Chirurgie, etc., par Vandermonde, Paris, 1757, Tome vii, p. 256.

[2] Recherches et observations sur toutes les parties de l'art du dentiste, 2 vols., Paris, 1757.

Sometimes, when the permanent canine comes forth, it has not room enough, and therefore grows outward. In this case Bourdet extracts the first premolar; the canine then advances gradually of itself toward the space left by the extracted tooth, until it occupies its place exactly. He also counsels the extraction of the first premolar on the opposite side of the jaw, in order to preserve the perfect symmetry of the dental arch on both sides. When the arch formed by the jaws is too large and of an ugly appearance, Bourdet advises extracting the first upper and lower premolars, so that the maxillary arches may acquire a more regular form. In cases in which the defect of form exists only in the lower jaw, that is, in children who have protruding chins, Bourdet corrects this deformity by extracting the first lower molars shortly after their eruption, that is, toward seven years of age. In this manner, says the author, the lower jaw grows smaller and the deformity disappears. The inventor of this method, as Bourdet himself tells us, was the dentist Capuron.

Bourdet made prosthetic pieces, whose base, representing the gums and the alveoli, was made entirely of gold and covered over with flesh-colored enamel on the outside, so as to simulate the natural appearance of the gums; the teeth were adjusted into the artificial alveoli and fixed with small pins. At other times he made use of a single piece of hippopotamus tusk, in which he carved not only the base, but also the three back teeth on each side, whilst the ten front teeth were human teeth fixed to the base with rivets.

One of Bourdet's principal merits is that of having brought artificial plates to perfection by fixing them not, as heretofore, to the opening of the palate or inside the nose, but by means of lateral clasps fitted to the teeth.

In a special pamphlet, published in 1764,[1] Bourdet treats of the diseases of Highmore's antrum. To facilitate the exit of pathological humors from the sinus, after the Cowper operation, he introduced a small cannula, forked at one end, into the antrum and fixed the two branches of the fork to the neighboring teeth by tying.

In some diseases of the maxillary sinus (polypus, sarcoma, etc.) Bourdet recommends cauterizing.

Besides his principal work, the pamphlet on the diseases of Highmore's antrum, and some others of less importance, Bourdet wrote an excellent book on dental hygiene,[2] which had the honor of two translations, one German, the other Italian; the latter published in Venice in 1773.

This celebrated author inveighs bitterly against charlatans and quack dentists, and throws light on all their impostures. It appears, however, that in the midst of this despicable class, so justly condemned by him,

[1] Sur les dépôts du sinus maxillaire.

[2] Soins faciles pour la proprieté de la bouche et pour la conservation des dents, Paris, 1759.

there existed a courageous though unscientific operator, to whom posterity would have attributed due honor had his name been handed down, for he was the first, in all probability, to try the implanting of teeth in artificial alveoli. This is, at least, what we deduce from a passage in one of Bourdet's works, in which we read that a charlatan sought to impose on the public the belief that he could make a hole in the jawbone and plant therein an expressly prepared artificial tooth, which in a brief space of time would become perfectly firm and as useful as a natural one. Bourdet adds that an attentive investigation led to the recognition of the said tooth being simply that of a sheep. It would appear, therefore, that the operation had been in reality performed, it matters but little whether with the tooth of a sheep or with one of another kind.

JOURDAIN was another eminent writer on dental matters, at this period. Rather than a true surgeon-dentist like Fauchard and Bourdet, Jourdain was a general surgeon who had dedicated himself with particular predilection to the study and treatment of oral and maxillary diseases. And precisely for this reason his writings, although of great scientific importance, are far from possessing for dental art, properly so-called, the same value as the works of Fauchard, Bourdet, and other great dentists of the eighteenth century. His works, as Geist-Jacobi justly observes, give us the impression of his having been a theorist rather than a practical dentist.

In 1759 Jourdain described in the *Journal de Médecine*[1] an improved pelican and another instrument to be used for straightening teeth inclined inward. Two years later he published his treatise on the diseases of Highmore's antrum and on fractures and caries of the maxillary bone.[2] After this, appeared his book on the formation of the teeth.[3] He therein describes with great accuracy the dental follicle from its first appearing to the moment of birth, following it throughout its evolution. This lengthy book is most interesting, for it is not a mere compilation, but gives the results of personal research and experience. But by far the most important of all the works of this author is his treatise on the diseases and surgical operations of the mouth.[4] This book went through several French editions, was translated into German in 1784, and has had, besides, two English editions in America of comparatively recent date, that is, at Baltimore in 1849, and at Philadelphia in 1851; all of which proves

[1] Vol. x, pp. 47 to 148.

[2] Traité des dépôts dans le sinus maxillaire, des fractures et des caries de l'une et de l'autre mâchoire, Paris, 1761.

[3] Essais sur la formation des dents, comparée avec celle des os, suivis de plusieurs expériences tant sur les os que sur les parties qui entrent dans leur constitution, Paris, 1766.

[4] Traité des maladies et des opérations réellement chirurgicales de la bouche et des parties qui y correspondent, suivi de notes, d'observations, et de consultations interessantes, tant anciennes que modernes, 2 vols. 8vo, Paris, 1778.

the great value of the work; it treats, however, much more of general surgery of the mouth and neighboring regions than of dental art properly so called. The first volume of 626 pages is almost entirely dedicated to the diseases of the maxillary sinus, which, for this author, were ever the object of favorite and particular study. He is not in favor of carrying out irrigation of the antrum through the mouth, even when an alveolar opening has resulted spontaneously through the extraction of a decayed tooth; he prefers instead, whenever this is possible, the reopening of the nasal orifice, by means of sounds and cannulæ adapted for the purpose, that is, varying in thickness and in length, and curved according to the necessities of the case. The natural opening of the antrum being reëstablished, one irrigates the cavity through it by means of a cannula to which a small syringe has been screwed. When the teeth are sound, notwithstanding the diseased condition of the antrum, Jourdain is absolutely contrary to the performing of the Cowper-Drake operation. When, on the contrary, the malady owes its origin to decayed teeth, Jourdain extracts them, but, as already said, carries out the detersive and medicated injections through the natural opening.

The author divides the collections of the maxillary sinus into purulent and lymphatic. The purulent are painful and corrode the bone, the lymphatic are not painful and do not corrode the bone, but distend and soften it, producing external tumefaction which yields to pressure, and, on this being diminished, gave out a characteristic sound. These so-called lymphatic gatherings referred to by Jourdain are none other than mucous cysts of the maxillary sinus. Also the other diseases of Highmore's antrum (polypi, etc.) are taken by this author into attentive and minute consideration.

The second part of the work is dedicated to the other diseases of the maxillary bones (especially of the inferior one), as well as to those of the lips, cheeks, salivary ducts, gums, frenum linguæ, etc. Dental hemorrhage and difficult dentition are also spoken of in this volume.

The author relates, with regard to the latter subject, that he had observed, in corpses of infants who had succumbed to a difficult dentition, that the crowns of the erupting teeth were covered by the alveolar margins folded upon them. This, according to him, must be the reason why even lancing of the gums proves useless in some cases of difficult dentition; it is therefore necessary, whenever it is possible to recognize the existence of this state of things, to destroy the bony margins that oppose the erupting of the teeth; the author declares that he has frequently done this, with fortunate results.

In 1784 Jourdain published a treatise on artificial dentures.[1] He

[1] Réflexions et éclaircissements sur la construction et les usages des rateliers complets et artificiels.

therein specially speaks of a complete denture with four springs, perfectly adapted to the purpose of mastication. The author attributes the merit of its invention to MASSEZ, who had imagined it toward 1772. If we may judge, however, by what Joseph Linderer says,[1] this denture appears to have been too complicated, even when compared with those described by Fauchard.

LAMORIER and RUSSEL, contemporaries of Jourdain, also studied the diseases of the maxillary sinus, and published in the *Mémoires de l'Académie de Chirurgie*, vol. iv, several important cases of polypi and other diseases of the antrum. Lamorier is not in favor of the Cowper-Drake operation. He recommends perforating the antrum immediately above the first molars, or rather between it and the malar bone. In this he seems to have been influenced by the considerations that the wall of the cavity here presents the least thickness, and that this is the most dependent part of the sinus. But he did not always deem it necessary to make a perforation here, when a fistulous opening had previously formed in some other place. His method of operating is as follows: The jaws being closed, the angle of the mouth is drawn outward and slightly upward with a curved instrument called by the author a speculum; this done, the gum is incised below the molar apophysis and the bone laid bare, and then pierced with a spear-pointed punch. The opening is afterward enlarged if found necessary.

Several contributions to the knowledge of the diseases of the maxillary sinus and their treatment were made about this time by Beaupréau, Dubertrand, Caumont, Dupont, Chastanet, Doublet, David, and especially by Thomas Bordenave, who published an important work on this subject, collecting a great number of clinical cases of great interest. Speaking of the Cowper-Drake operation, he expresses the opinion that the tooth to be extracted is not the same in all cases, for if some one of the teeth situated below the maxillary sinus should either show signs of decay or be the seat of persistent pain, the choice should fall upon that one. If, however, these teeth are all apparently sound, the one should be chosen that, under percussion, is most sensible to pain. In those cases in which the choice is altogether free, Bordenave prefers the extraction of the first large molar, for the double reason that it is generally situated in correspondence to the central part of the cavity, and that it is separated from the antrum by a very thin osseous lamina. In certain cases, the maxillary sinus is divided, by body lamellæ, into various cavities, and then, as one easily understands, it may be necessary to extract more than one tooth for the evacuation of the pathological contents. When the teeth situated below the antrum have fallen out, or have been extracted

[1] Die Zahnheilkunde, Erlangen, 1851, p. 398.

some time, and their alveoli are in consequence obliterated, it will be better to have recourse to Lamorier's method. This method may besides be useful, according to Bordenave, either when all the teeth are sound and it would consequently be a pity to sacrifice any of them, or in special cases (such as large polypi of Highmore's antrum, extraneous bodies, etc.) in which the Cowper-Drake operation would not afford sufficient space.

L. B. LENTIN, a German, in 1756, published a pamphlet[1] in which he recommended electricity as a means of cure for toothache. Other writers recommended the use of the magnet, which means of cure had already been advised for various affections by Patacelus. During the latter half of the seventeenth century, Talbot, J. J. Weckes, and P. Borelli related several cures of headache and toothache by the use of the magnet. In the eighteenth century F. W. Klaerich, a medical man in Göttingen, wrote that he had used the magnet advantageously in not less than 130 cases of toothache.[2] We find it recommended later by others, Brunner, and particularly J. G. Teske, who, in 1765, wrote a pamphlet entitled *New experiments for the curing of toothache by means of magnetic steel.*[3]

He considers the use of the magnet as the most efficacious of all remedies against toothache, and believes its action to be similar to that of electricity.

In the following year, however, the belief in the new means of cure was sensibly shaken by F. E. Glaubrecht, who declared that although the magnet calms or causes the cessation of the pain at first, it returns constantly and with much greater violence.[4] The curing efficacy of the magnet in cases of toothache was highly vaunted in France by Condamine.[5]

PASCH attributes the effects of the magnet to the chill produced in the parts to which it is applied; in proof of this he adduces the fact that if the magnet becomes heated by being kept some time in the hand, it loses its efficacy altogether, whilst on the other side one may obtain the very same beneficial results with a simple steel spatula, just on account of the action of the cold; finally, he adds that the chill produced by the magnet on the affected part explains very well not only the good, but also the bad effects which it produces in many cases, such as increase of the pain, inflammation, tumefaction, and even at times spasmodic contractions.[6] Thenceforth the enthusiasm for the magnetic cure diminished gradually, all the more so inasmuch as that shortly after the celebrated English

[1] Von der Wirkung der elektrischen Erschütterung im Zahnweh.

[2] Geist-Jacobi, p. 165.

[3] Neue Versuche zu Curirung der Zahnschmerzen vermittelst eines magnetischen Stahles, Königsberg, 1765.

[4] F. E. Glaubrecht, De odontalgia, Argentorati, 1766.

[5] Journal de Médecine, 1767, p. 265.

[6] Jos. G. Pasch, Abhundlung aus der Wandarznei von den Zähnen, etc., Wien, 1767.

dentist Thomas Berdmore ridiculed it by placing it in the same class as charms, exorcisms, and other foolish and superstitious means of cure.[1]

ADAM ANTON BRUNNER. One of the most distinguished German dentists in the second half of the eighteenth century was Adam Anton Brunner. His two principal works are the *Introduction to the science necessary for a dentist*,[2] and the *Treatise on the eruption of the milk teeth*.[3]

This author falls into various errors with regard to deciduous teeth. According to him they are twenty-four in number, and without roots; but these may develop in those milk teeth which in exceptional cases remain in their places after the period in which they generally are shed.

A milk tooth, says Brunner, ought never to be extracted unless there be manifest signs of the presence of the corresponding permanent tooth, or when it is painful and decayed. Badly grown teeth can often be put in order solely by the pressure of the fingers frequently repeated, but when this is not sufficient, one must have recourse to waxed threads or to special contrivances.

In applying a pivot tooth, he screws the pivot to the artificial crown and perforates the root canal only just sufficiently to admit the other extremity, which he drives in by little strokes of a hammer upon the crown, without its being necessary to use cement. We learn from this author that in his time there were turners and other craftsmen who occupied themselves with dental prosthesis.[4]

Brunner prefers gold for fillings to any other substance whatever.

J. G. PASCH, whose name we have already mentioned, relates the case of a young maidservant becoming suddenly affected with deafness, and who recovered her hearing completely on the eruption of one of her wisdom teeth. From a passage of this author's we learn that at that time many had recourse to the crushing of the infraorbital nerve as a cure for certain cases of toothache. He, however, decidedly rejects such a remedy, as it proves for the most part ineffectual and may, besides, produce very serious consequences. This author carried out many experiments as to the effects of acids on the teeth.[5]

C. A. GRÄBNER[6] recommends not deceiving children by extracting their teeth unexpectedly, but rather to persuade them of the necessity of the operation; for by deceiving them one loses their confidence, and in many cases inspires them with an invincible aversion to the dentist.

This author invented a so-called "calendar of dentition," for the

[1] Th. Berdmore, A treatise on the disorders and deformities of the teeth and gums, London, 1768.

[2] Einleitung zur nöthigen Wissenschaft eines Zahnarztes, Wien, 1766.

[3] Abhandlung von der Hervorbrechlung der Milchzähne, Wien, 1771.

[4] J. Linderer, vol. ii, p. 431.

[5] Geist-Jacobi, p. 166.

[6] Gedanken über das Hervorkommen und Wechseln der Zähne, 1768.

purpose of showing at a glance the period of eruption of each of the deciduous and permanent teeth, and as well for noting down the time at which the various teeth are changed, so as to avoid every possible error in this respect. This calendar consists of a figure or diagram representing the two dental arches, with transversal lines that separate the different teeth one from the other, the relative indications being also given.

The observations of this most sensible and conscientious dentist with regard to the extraction of teeth are worthy of note: "The haphazard pulling out of a tooth is an easy enough thing; the only requisites for doing this are impudence and the audacity natural to the half-starved charlatan. But to carry out the extraction of a tooth in such a manner that, whatever be the circumstances of the case, no disgrace may accrue to the operator or damage to the patient, requires serious knowledge, ability, and prudence."

RUEFF relates the case of a man, aged forty years, who, having made use of fumigations of henbane seeds to relieve himself of violent toothache, obtained the desired end, but at the same time lost his virile power. He, however, reacquired his force by the care of the author.[1]

THOMAS BERDMORE was the dentist of George III of England, and one of the first and most eminent representatives of the dental art in that country. Before him, no one had had the appointment of dentist to the royal family. In the year 1768 he published an excellent work on dentistry,[2] that was translated into various languages and went through many editions; the last of these appeared in Baltimore in the year 1844, that is, seventy-six years after the first English edition—a splendid proof of the worth and fame of this work.

Berdmore contributed to the progress of dentistry in England not only by his writings, but also by imparting theoretical and practical instruction to many medical students desirous of practising dental art as a specialty.[3] One of these was ROBERT WOOFFENDALE, who went to America in the year 1766, and was the first dentist whose name is there recorded.

Berdmore considers as the principal advantage of the application of single artificial teeth the support they afford to the neighboring ones. Although in no way an impassioned partisan of dental grafting, like his contemporary, the celebrated surgeon Hunter, he, nevertheless, sometimes had recourse to replantation, recognizing the advantages to be derived from this operation, provided it be ably and opportunely carried out; but he was decidedly averse to transplantation. Before definitely inserting a gold filling, Berdmore considers it a good practice to try the

[1] Carabelli, p. 91.

[2] A treatise on the disorders and deformities of the teeth and gums, London, 1768.

[3] See The Rise, Fall, and Revival of Dental Prosthesis, by B. J. Cigrand, p. 148.

tolerance of the tooth with a temporary filling of cement or some other like substance. His experiments as to the action of acids on the teeth are most interesting. He found that nitric acid destroys the enamel in a quarter of an hour; muriatic acid acts almost as rapidly, but with the difference that it also alters the color of the interior parts; sulphuric acid renders the teeth very white, and, even if used for three or four days, only destroys a small portion of the dental substance, but by reason of its action the enamel becomes rough and can be easily scraped away with a knife. Remarkable experiments on this subject were also made later by Kemme.[1]

PIERRE AUZEBI, a dentist at Lyons, published a treatise on odontology in 1771, which is only remarkable for certain strange ideas that he therein exposes, the entire book being in complete contradiction with the great progress already realized, at that period, in dental science. Auzebi likens the human body to a hydraulic machine, formed by the union of solid and liquid parts. For him the bones are merely *folded membranes* and the teeth are *bones composed of small membranes*. The author declares that he is unable to admit the theory of germs in the genesis of the teeth because "these germs, being all in identical conditions as to heat and moisture, ought all to develop at the same time like the grains of corn in a field." Rather than having their origin from special germs, the teeth, he says, are derived from lymph, this being, according to Auzebi, the fundamental substance from which all the hard parts of the body are generated. A drop of lymph gathered at the bottom of the alveolus hardens and constitutes the first beginning in the formation of the teeth. Beneath this other lymph is gradually collected, which pushes upward and the part of the tooth already formed, surrounds the dental vessels, and thus becomes the root of the tooth. To facilitate dentition he recommends, among other things, rubbing the gums with hard, rough, and angular bodies. He also maintains, as does Brunner, that the milk teeth have no roots, contradicting, in this respect, the opinion of Fauchard, of Bunon, of Bourdet, who decidedly affirm that the deciduous teeth are furnished with roots, precisely the same as the permanent ones. According to him, when it so happens that the milk teeth have roots, they are not shed. To calm toothache, the author recommended a sedative elixir, the aspirating of a few drops of which sufficed to obtain the desired effect.[2]

JOHN AITKIN, in 1771, perfected the English key, so as to render the extraction of the teeth easier and to avoid the danger of fracturing the alveolus or the tooth itself, and of injuring the gums.[3]

[1] Carabelli, p. 91.

[2] Carabelli, p. 93; Lemerle, Notice sur l'histoire de l'art dentaire, p. 117.

[3] J. Aitkin, Essays on several important subjects in surgery, London, 1771.

FRÈRE CÔME, a celebrated French surgeon, also contributed to the perfecting of this instrument.[1]

In 1771-72, Fr. L. Weyland and Henkel recorded some very important cases of diseases of Highmore's antrum.[2]

W. BROMFIELD, in a collection of surgical observations and cases published in London in the year 1773, also speaks of affections of the maxillary sinus. He says that he has had opportunity of persuading himself that the purulent gatherings of this cavity not unfrequently discharge spontaneously during the night, finding their exit through the natural orifice of the antrum, when the body is in the horizontal position.[3]

JOHN HUNTER, the celebrated surgeon, must be named among the most illustrious champions of odontology in England. He was born February 13, 1728. His first instructor in medical studies was his brother, William Hunter, a scientist of great merit, whose school of anatomy in London was attended by numerous students from all parts of the British Kingdom. Under so excellent a guide John Hunter made rapid progress, and in less than twenty years became the most famous physiologist and professor of surgery of that day. He was surgeon-general to the English army.

His *Natural History of the Human Teeth* (London, 1771) and his *Practical Treatise on the Diseases of the Teeth* (London, 1778) initiated in England a new epoch for the dental art, which, abandoning its blind empiricism, began to take its stand on the basis of rigorous scientific observation.

But although Hunter's merits were great with respect to the scientific development of odontology, we must remember that he was a general surgeon, and not a dentist, and that precisely for this reason he had not, neither could he have, other than a restricted personal experience relative to the treatment of dental diseases. This explains why the anatomical and physiological part of Hunter's works on the teeth is so far superior to the part concerning practical treatment.

Indeed, in the field of practice, this author often falls into grave contradictions, and is frequently hesitating and uncertain on important points of dental therapeutics.

Hunter gives a very long and detailed description of all the parts constituting the oral cavity and the masticatory apparatus. He sought to establish a scientific nomenclature for the teeth, and in fact the denominations of *cuspidati* for the canine teeth and of *bicuspids* or *bicuspidati* for the small molars originated with him. Hunter says that the enamel of the teeth is a fibrous structure, and that its fibers depart from the body

[1] Sprengel, vol. ii, p. 348. [2] Sprengel, p. 350.

[3] Bromfield, Chirurgical observations and cases, London, 1773.

of the tooth like rays. He believes it to be entirely inorganic, as it is absolutely impossible to convert it into animal mucus. The tooth is constituted for the most part by a long mass (it is thus he calls the dentine), which is, however, much harder and denser than any other bone. This part of the tooth is formed of concentric lamellæ, and is vascular, as is proved by the exostosis of the roots and the adhesions that exist at times between the roots and the alveoli. Hunter gives a good description of the pulp cavity and of the pulp itself. He studied odontogeny with great care, as is demonstrated by his special researches on this point. He admits the existence of distinct germs for the enamel and for the dentine. According to him the incisors are formed from three points of ossification, the canines from one, and the molars from three or four. The tooth after its eruption is an extraneous body "with respect to a circulation through its substance, but they have most certainly a living principle by which means they make part of the body, and are capable of uniting with any part of a living body." The milk teeth, says Hunter, are not shed by a mechanical action of the second teeth, but by an organizing law of Nature. The physiology of the masticatory apparatus is treated by Hunter with great accuracy and most extensively. This author combats, by many arguments, the opinion that the teeth grow continually; he explains the apparent lengthening of those teeth whose antagonists are wanting, by the tendency of the alveoli to fill up, which, however, is not possible in normal conditions, because of the constant pressure exercised upon the teeth by their antagonists.

Caries, says Hunter, is a disease of altogether obscure origin; it is not owing to external irritation or to chemical processes, and seems to be a morbid form altogether peculiar to the teeth. Only in very rare cases does it attack the roots of the teeth. It rarely appears after fifty years of age. Hunter does not admit that this disease may be communicated by one tooth to another. As to its treatment, the caries, if superficial, may be completely removed by filing the decayed part of the tooth before the disease penetrates to the cavity, and its spreading will thus be arrested for a time at least. In cases where the caries penetrates to some depth, without, however, the destruction of the crown of the tooth being so extensive as to render it useless, Hunter believed the best mode of treatment to be extraction and replanting of the tooth after having subjected it to boiling in order to cleanse it perfectly and to destroy its vitality entirely, this being, according to him, the mode of preventing the further destruction of the tooth, which once dead can no longer be the seat of any disease. If, instead, one wishes to have recourse to cauterization of the nerve, it is necessary to reach as far as the apex of the root; which, however, is not always possible. This is a very important point, for no one before Hunter had yet affirmed the necessity of entirely destroying the diseased

pulp as an indispensable condition of the success of the filling to be later carried out in order to conserve the tooth.

Hunter is extremely concise when speaking of the filling of teeth; considering the great importance of this argument, his conciseness can only depend on his having had no personal experience in the matter. He considers lead preferable for fillings.

The frequent occurrence of erosion of the teeth, whether of the cuneiform variety or of other kinds, did not escape the attention of this acute observer, but he was not able to give any explanation of it.

In cases of empyema of Highmore's antrum, Hunter advises the opening of the cavity through the alveolus of the first or second large molar.

Periodontitis is classified by the author among the diseases of the alveolar process. He occupies himself with this affection at great length, seeking to explain the mode in which it is produced. He distinguishes two forms of the disease, according to whether or not there be exit of pus from the alveolus. The alveolar process is, in his opinion, the principal seat of the disease, to which, as a complication, is added the retraction of the gums. For the diseased alveolus the tooth becomes, in a certain manner, an extraneous body, of which it tends to rid itself. The alveolar margins undergo absorption; the bottom of the alveolus tends to fill up, analogously to what occurs after extraction, and the falling out of the tooth ensues as a natural consequence of this process. An altogether similar process, producing the falling out of the teeth, is the normal consequence of senility.

The author considers that the malady in question has as its point of departure an irritation caused by a tooth; and as almost a proof of this he relates a case in which the extraction of the affected tooth, an upper incisor which became too long, and the transplantation of another tooth caused the cessation of the morbid process and the perfect consolidation of the transplanted tooth. However, Hunter does not draw from this isolated case the conclusion that transplantation may be elevated to a method of cure for this malady. Indeed, he says that, so far as is known to him, there is no means of prevention or of cure for it. His treatment, therefore, is merely directed to the curing, in so far as is possible, the phlogistic symptoms, by scarifications of the gum and by the use of astringent remedies. He does not exclude the possibility of a complete recovery, but the mode in which this obtains seems to him as obscure as is the nature of the disease itself.

In speaking of the correction of dental irregularities, Hunter advises not to extract the milk teeth unless this be an absolute necessity. He says, besides, that it is useless to extract any tooth whatever, unless one endeavors at the same time to force the irregular tooth or teeth into their

normal position by exercising the requisite pressure upon them. In young subjects the regulating of crooked teeth is an easy matter, because of the softness of the maxillary bone. However, it should not be undertaken before all the bicuspids have come through. To correct protrusion of the upper jaw, the author recommends the extraction of a bicuspid on each side. To regulate the incisors it is sometimes necessary to make them rotate on their axis with the forceps. In certain cases of protrusion of the lower jaw one may have recourse with advantage to the inclined plane.

As a general rule, it is useless to lay bare a tooth with the lancet before extracting it, although in certain cases this may be advantageous in order to render its extraction easier and less painful.

Hunter was a strenuous partisan of replantation and transplantation of the teeth; he made various experiments on animals, and treated this important argument with particular fulness and much better than had been done up to then by others.

In cases of difficult dentition he considered incision of the gums most useful and, if necessary, to be had recourse to several times.

Foucou, the French dentist, in 1774, made known a compressor invented by him for arresting hemorrhage ensuing on the extraction of teeth. This instrument, which could be used for either jaw, exercised its pressure not only in a vertical direction, but also laterally, and did not give much inconvenience to the patient. Carabelli, who wrote seventy years later, speaks with praise of Foucou's compressor, which he considers the best instrument of its kind.

Courtois, in his book published in 1775,[1] says that the enamel of the teeth only reaches its perfection of development at twenty to twenty-two years of age, and begins thenceforward to wear away gradually. In speaking of the enamel, he advises avoiding the use of the file as much as possible. This author's book is interesting for the many important clinical cases it contains.

Willich, in 1778, related a most curious case relating to a woman, aged forty years, who had never had her menstrual function, but had, nevertheless, given birth to two children; the extraction of a tooth was followed by an alveolar hemorrhage that lasted an hour; thenceforward, this hemorrhage recurred regularly each month, for the space of eight years.

Bücking, in 1782, published a *Complete Guide to the Extraction of the Teeth*,[2] wherein he minutely describes all the instruments, their use, the position of the operator and of the patient, indicating at the same time the instruments best adapted for the extraction of each tooth. He declares

[1] Le dentiste observateur, Paris, 1775.

[2] Vollständige Anweisung zum Zahnausziehen, Stendal, 1782.

himself averse to the practice of subluxation as a means of cure for tooth-ache, a method which, first recommended by the Arab physician Avicenna, and later, in the sixteenth century, by Peter Foreest, had fallen into oblivion for a long time, and was again brought into credit by two celebrated French dentists, Mouton and Bourdet, the latter of whom relates having had recourse to it successfully in not less than six hundred cases.

Notwithstanding the high authority of this illustrious dentist, Bücking does not consider this method of cure advisable, adducing, however, in support of his opinion, arguments of no great value, viz., that teeth after subluxation continue painful for a certain time, and that they always remain in an oblique position. The method in question, which has the effect of breaking the dental nerve, is, in our opinion, practically equivalent to a replantation, or is, in point of fact, a replantation, when the luxation of the tooth is complete. The arguments that Bücking brings forward against it are futile; the first objection, for the most part, does not subsist, and, in any case, the persistence of pain for a short time would be of small importance compared with the great advantage of preserving the tooth; as to the second, it is to be understood of itself that subluxation performed by means of the pelican (the instrument then used for the operation) would cause the tooth to assume an oblique position; but even supposing it did not straighten up of itself, there could not have been any difficulty for the good dentists of that period in forcing the tooth again into normal position and in maintaining it there. The weak side of the operation consisted rather in the fact of its being probably carried out without due consideration of the dangers resulting from the possible alterations of the dental pulp.

At the time of which we are writing many believed that the enamel of the teeth could be regenerated altogether or in part, and that, therefore, it was of no great consequence that it should be worn away by the use of the file or of abrasive dentifrice powders. Thus, for example, the renowned surgeon Theden expressly recommended such powders, as the best adapted for cleaning the teeth and for freeing them from tartar.[1]

Van Wy,[2] the Dutch surgeon, in 1784, related two cases of regeneration of the maxillary bones; other cases of the same kind were related some years later by Percy and Boulet.[3]

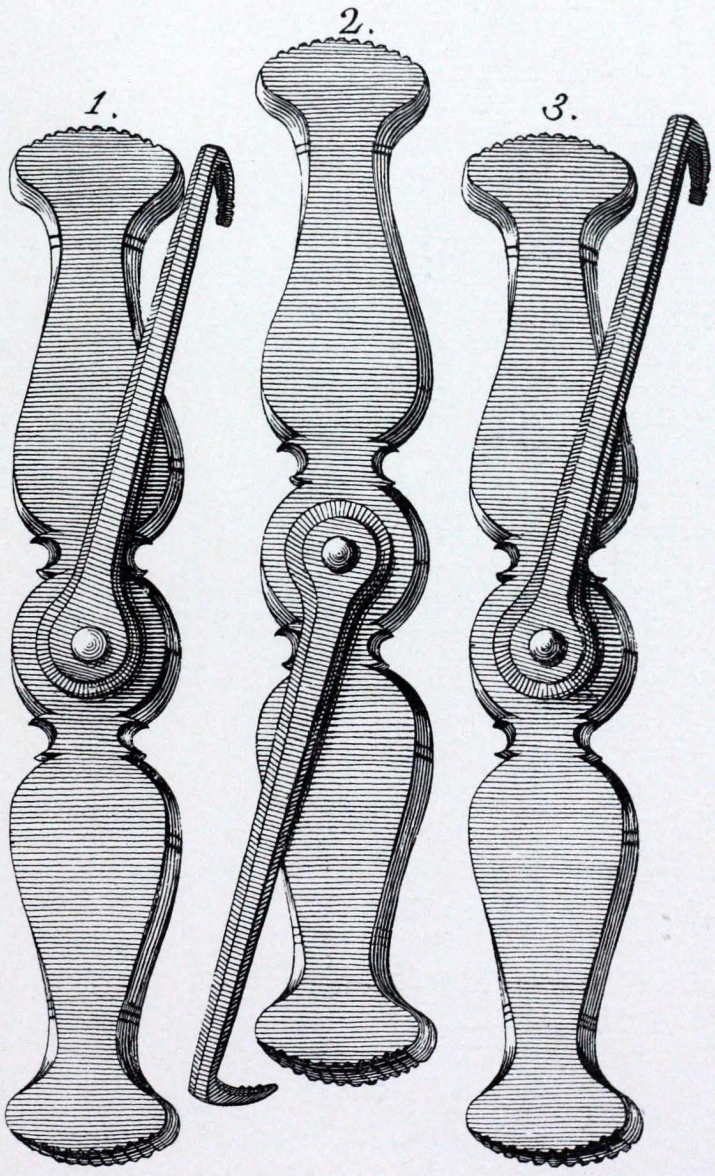
Chopart and Desault recommended, in cases of difficult dentition, the excision of the gum in correspondence with the teeth that are to come out, rather than simple incisions.[4]

[1] Theden, Neue Bemerkungen und Erfahrungen, Berlin, 1782, part second, p. 254.
[2] J. van Wy, Heelkundige Mengel stoffen, Amsterdam, 1784.
[3] Journal de Médecine, 1791, tomes 86, 87.
[4] Sprengel, p. 356 to 357.


ANTONIO CAMPANI
Pubblico Dentista
della Città di Firenze.
Diomira Franchi del.
Carboni Scul.

Antonio Campani, of Florence, published in 1786 a treatise on dentistry,[1] very elegantly printed, and illustrated with thirty-six plates very

Fig. 96



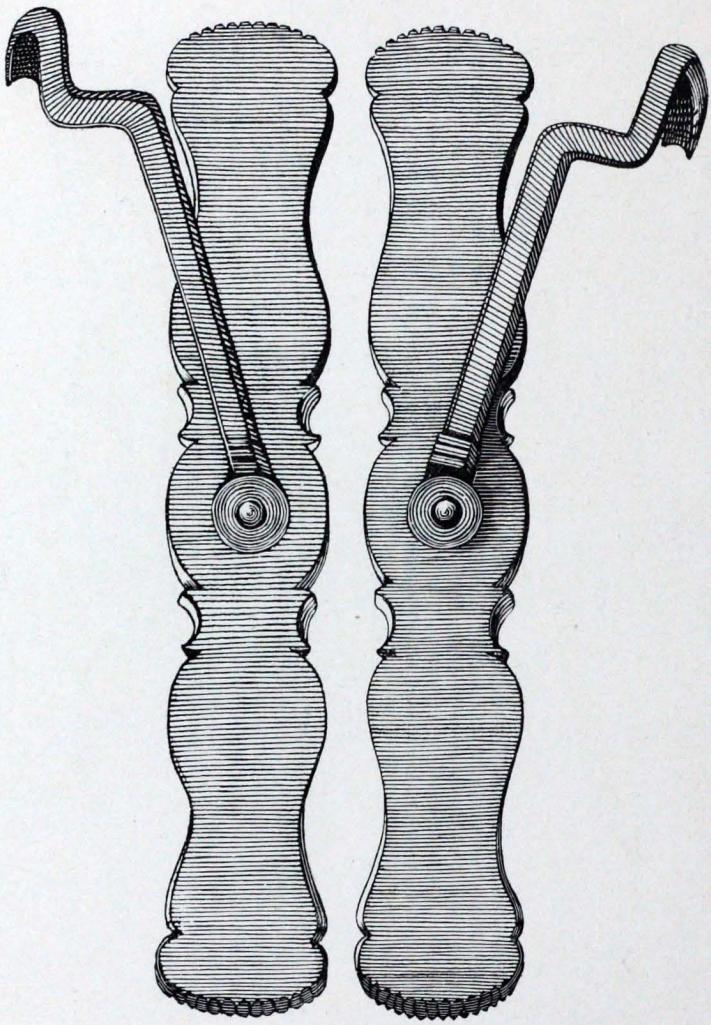
Pelican for extracting incisor, canine, and molar teeth (Campani, 1786).

neatly carried out. This book, however, contains nothing of real importance for the development of dentistry.

[1] Odontologia, ossia Trattato sopra i Denti.

Benjamin Bell, the English surgeon, a contemporary of Hunter, also devoted much attention to diseases of the teeth, and, if it may be argued from the clear and precise manner in which he expresses his opinions on various questions relating to dental pathology and therapy, it would seem that he had much greater experience in this field than the celebrated Hunter.

Fig. 97

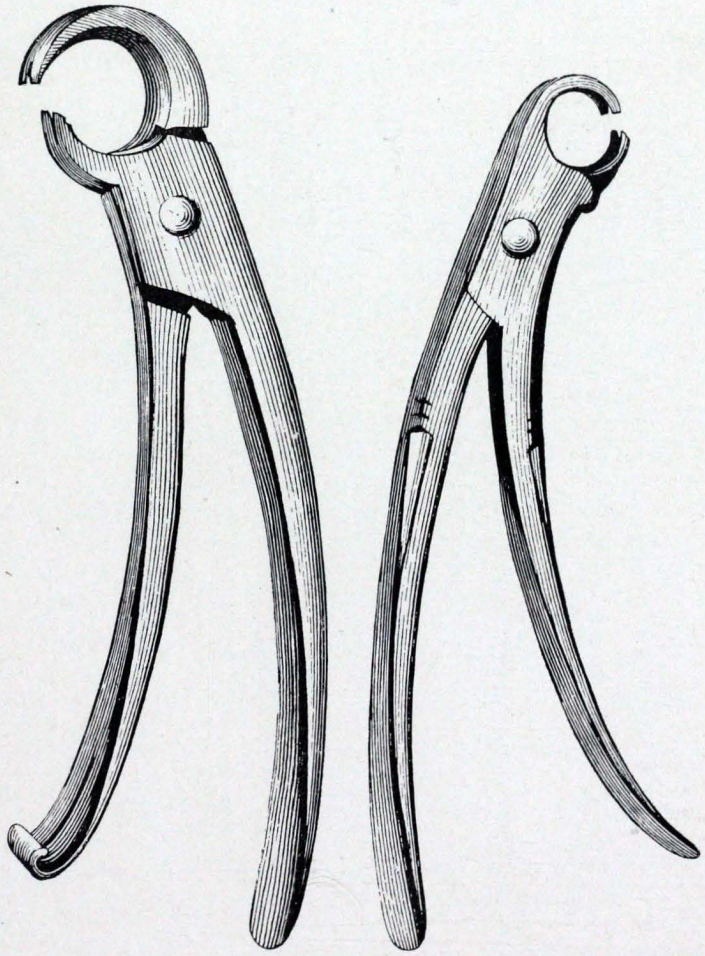


Pelicans for extracting wisdom teeth (Campani).

With regard to incision of the gums, in cases of difficult dentition, this author contradicts certain assertions of the German surgeon Isenflamm (1782), who argued that when the tooth is already to be perceived through the gum, the incisions are altogether useless, while if the tooth be still at some depth, the gingival incision will soon close again, so that the cicatrix

will render the eruption of the tooth still more difficult. Bell admits, too, that lancing the gum is altogether superfluous when the tooth has pierced the tissue, all the more so that the accidents provoked by the eruption are then generally already passed and gone, but the operation ought, in his opinion, to take place much earlier; and should the wound close again before the tooth has erupted, the gum must be lanced a second time.

FIG. 98

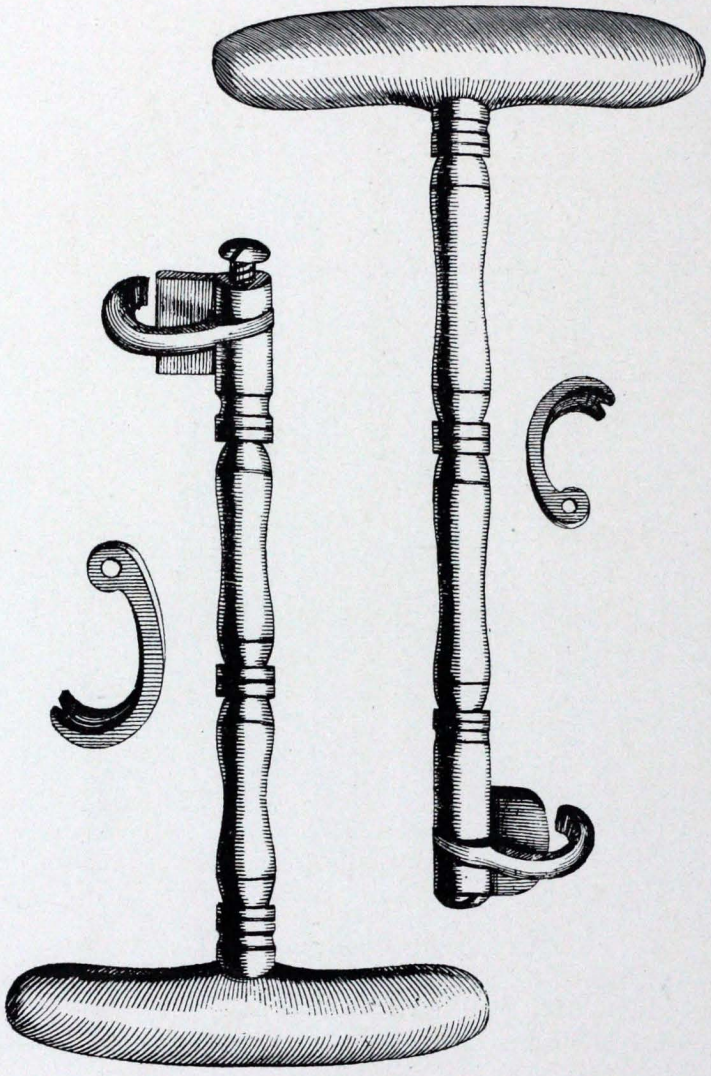


Campani's forceps: The first for molar teeth when loose or after having been shaken with the pelican; the second for deciduous teeth.

Bell contradicts the opinion of Jourdain and Hunter that the morbid gatherings of Highmore's antrum are generally consequent upon the closing of the normal opening of the cavity in the middle meatus. In many cases of disease of the maxillary sinus this orifice remains open, the liquid therein collected discharging itself not unfrequently through it, in certain positions of the body. Instead of penetrating into the antrum

through the nasal orifice, as Jourdain would have it, Bell advises opening the cavity by Lamorier's, or, better still, by Drake's method. Except in special cases, the first or second molar ought to be extracted, but preferably the second. After trepanning the alveolus and emptying the cavity,

FIG. 99

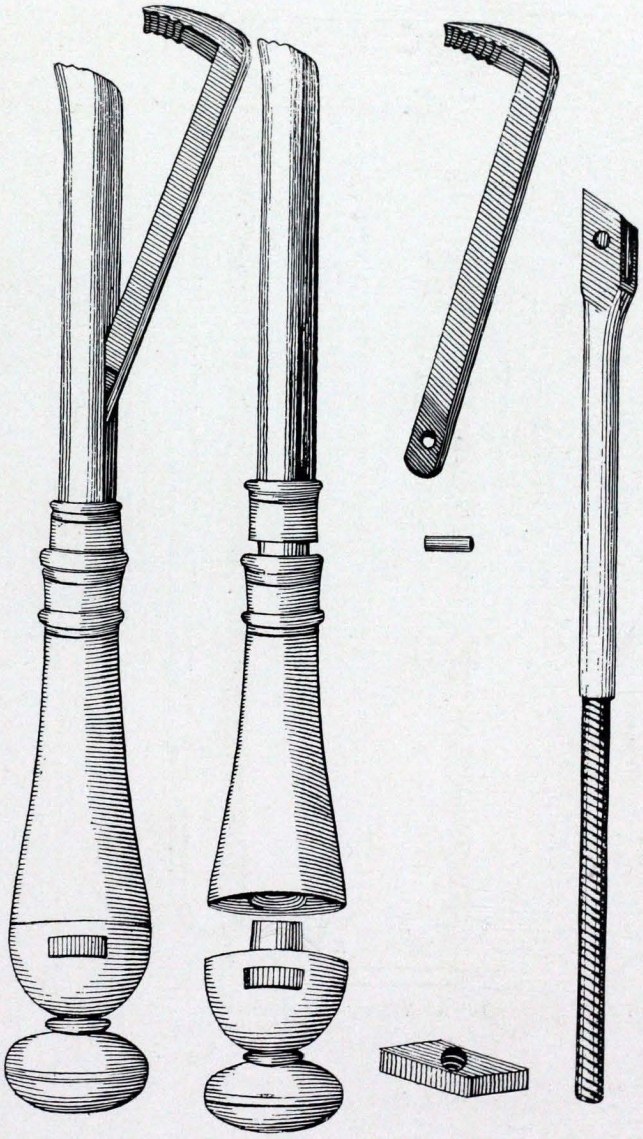


Two key instruments with changeable hooks (Campani).

the opening should be closed with a conically shaped peg to prevent its slipping into the cavity. From time to time the liquid that tends to reaccumulate should be allowed exit, and detersive injections should be made, preferably of lime water.

Looseness of the teeth, which in old age may be considered a normal condition, is always a disease when it occurs in youth. In certain cases its cause is unknown, in others it depends on an affection of the gums, either of a scorbutic nature or consequent on an accumulation of tartar.

FIG. 100

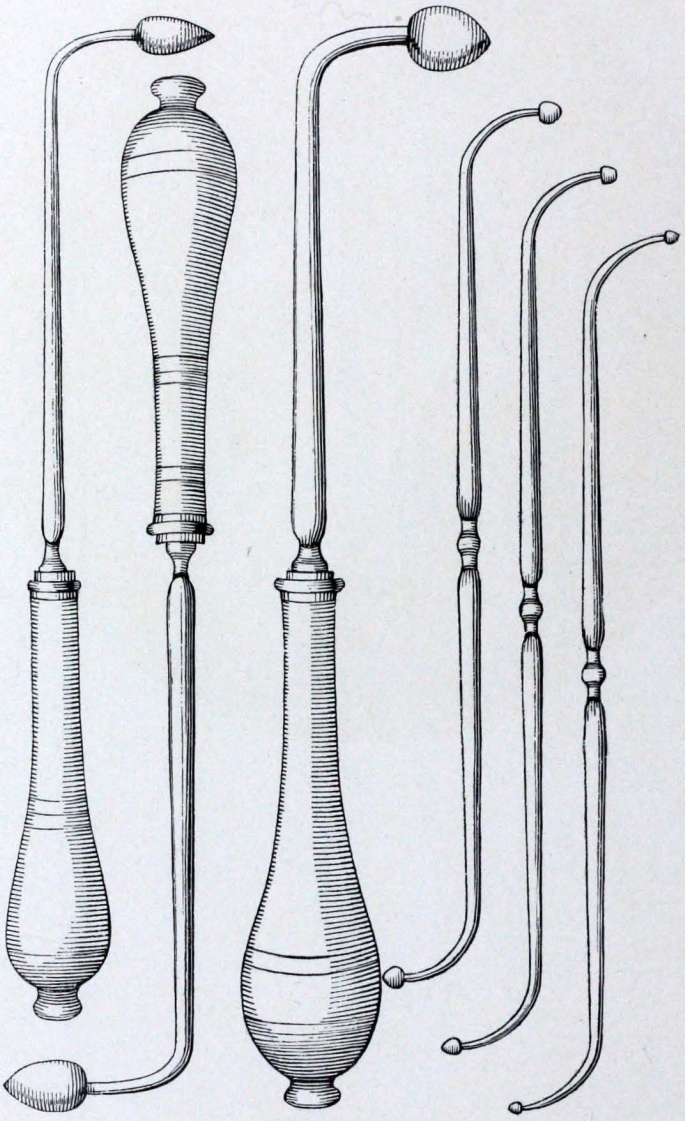


An instrument especially destined to extract loose bicuspid teeth. The screw in the interior of the instrument allowed the hook to be brought to just the right point in each case (Campani).

According to Bell, dental caries is generally owing to a bad condition of the humors of the entire body and to a peculiar morbid disposition,

rather than to external causes acting locally, although these latter may contribute, together with the general causes, to the producing of the disease.

FIG. 101



Campani's dental cauteries: The large ones for cases of post-extractive hemorrhage; the small ones for the cauterization of carious cavities.

This author was decidedly averse to the use of the file. For stopping carious cavities he advises the use of mastic, gum lac, or wax, if the cavity is large and funnel-shaped; this stopping, however, requires to be renewed frequently. But when the cavity, wider at the bottom, narrows toward

N.LAS DUBOIS DECHÉMANT, *CHIRURGIEN,*

DENTISTE INVENTEUR DES DENTS DE PÂTE MINÉRALE

Ces perles d'une si belle eau.
Qui, dès notre plus tendre enfance.
Germent déjà dans le berceau.
Pour parer notre adolescence.
C'est le secret du Créateur
Et le rôle de la nature.
Mais après cet unique acteur.
Vivat CHÉMANT *pour la doublure.*

Le grand point toujours réservé
Au seul artiste incomparable.
C'est bien CHÉMANT *qui l'a trouvé*
Il joint l'utile et l'agréable.
Quand la faux du temps a détruit
Du palais la brillante armure.
Avec la sienne, on mange, on rit.
Vivat CHÉMANT *pour la doublure.*

Couplets du Général C.te de Martange

the surface, one ought to use gold or, still better, tin-foil. The pulp ought always to be destroyed previously by cauterization.

Bell advises great caution in carrying out transplantation, it having been proved by many examples that contagious maladies of a serious nature may easily be communicated in this way from one individual to another.[1]

In the case of a young woman who had an upper incisor transplanted, WATSON observed undoubted symptoms of syphilitic infection with supervening accidents of exceptional gravity, which in spite of careful treatment ended in death.[2]

Hunter also relates having observed, in seven cases of transplantation, very serious accidents which, however, he did not believe to be owing to syphilis, although bearing a certain symptomatic resemblance to it. Contrariwise, the well-known German surgeon Richter not only admitted the possibility of transmitting syphilis through a transplanted tooth, but even that the transplantation of an altogether healthy tooth from the mouth of a person undoubtedly free from syphilis might be followed by serious accidents of a syphilitic nature, and this because the possible existence of a latent syphilis in the person to whose mouth the tooth was transplanted cannot be excluded; in which case the abnormal stimulus exercised by the transplanted tooth might very well give rise to syphilitic manifestations. Therefore, the fact that the person who furnished the tooth was and continued to be in a state of perfect health (as precisely in the case cited by Watson) would not be sufficient proof that the accidents ensuing on the transplantation might not be of a syphilitic nature.

LETTSON also observed, in certain cases of transplantation, accidents of more or less gravity which he held to be due to syphilis, calling, however, to mind a case cited by Kuhn, of Philadelphia, where the possibility of syphilis was not to be thought of, as the morbid symptoms disappeared entirely, without any treatment, as soon as the transplanted tooth was removed.[3]

AUGUST G. RICHTER, the above-named German surgeon, in those portions of his work dedicated to dental affections and diseases of Highmore's antrum, treated these subjects with admirable clearness and order, without contributing, however, anything original to the development of dental surgery.[4]

NICHOLAS DUBOIS DE CHEMANT, in 1788, of whom we shall later have occasion to speak again, published in Paris his first pamphlet on mineral

[1] Benjamin Bell, System of Surgery, 1783 to 1787, vol. iii.

[2] Medical Transactions of the College of Physicians of London, 1783, vol. iii, p. 325.

[3] Memoirs of the London Medical Society, 1787, vol. i.

[4] August Gottlieb Richter, Anfangsgründe der Wundarzneikunst, vol. ii (1787) and vol. iv (1797).

teeth, entitled *Sur les avantages des nouvelles dents, et rateliers artificiels, incorruptibles, sans odeur.*

JEAN JACQUES JOSEPH SERRE (1759 to 1830). Among the dentists of he end of the eighteenth century and the beginning of the nineteenth, a special mention is due to Jean Jacques Joseph Serre. He was born at Mons, in Belgium, but his remarkable practical and scientific activity was chiefly called into exercise in Vienna and in Berlin. He published several works, the most important of which is a practical treatise on dental operations.[1]

Among his minor works, one edited in Vienna, in 1788, treats of toothache during pregnancy; another, printed in Leipsic in 1791, treats most extensively of diseases of the gums; a third speaks of the mode of maintaining the teeth and gums in good condition. This little book of dental hygiene, like the rest of Serre's books, met with great favor, and went through two editions in a brief space of time (Berlin, 1809 to 1812).

The works of this author show great study, very wide practice, and an admirable spirit of observation and research. They had the merit of greatly contributing to raise the level of dental culture in Germany, and one finds in them a pretty nearly complete account of the dentistry of that period. Apart from this, they possess a special interest because of the vast number of dates and important historical facts therein contained.

As it would be useless here to enter into a minute analysis of the contents of these books, we will limit ourselves to mentioning a few ideas of which Serre was a strenuous supporter.

He combats an old prejudice that had recently been reinforced by the authority of Jourdain, that is, that it does harm to extract a tooth when the soft parts around it are inflamed and swollen. He likewise combats the prejudice, also of very ancient date, that teeth ought not to be extracted during pregnancy. Only, he considers it as well to avoid the cauterization of the dental pulp in cases of gestation. In extracting teeth, the forceps ought only to be used after the tooth has been luxated by means of the pelican. Serre highly approves of this instrument, although he recognizes it to be a dangerous one in the hands of those who do not know how to make a proper use of it. This author invented or perfected various extracting instruments, among which a conical screw for extraction of roots hollowed out by caries deserves particular mention, and which, under a somewhat modified form, is still in use.

One of the most interesting chapters of Serre's great work is the one in which he treats of affections of Highmore's cavity.[2] He speaks at length of the anatomy of the maxillary sinus, of its relation to the teeth

[1] Praktische Darstelling aller Operationen der Zahnarzneikunst, Berlin, 1803 and 1804.

[2] Chapter xlii.

Johann Jacob Joseph Serre

Geboren, den 5te May 1759.
in Mons. in vormaligen Niederlanden

situated below it, of the various modes in which the diseases of the antrum are produced, of their symptoms and treatment. He passes in review the various operative methods, and finds that in general the Cowper-Drake is the one to be preferred to all the others. He says that to open the sinus the simple extraction of a molar suffices in the greater number of cases, the trepanning of the alveolus not being generally necessary.

J. ARNEMAN, in 1766, published at Göttingen a synopsis of surgical instruments[1] that deserves mention in so far that the dental instruments of that time as well as those of earlier periods are therein taken into account with sufficient exactness.

A. F. HECKER attributed the accidents of difficult dentition to a special alteration of the saliva caused by the irritation deriving from the erupting teeth. In these cases the saliva is supposed by him to acquire a high degree of acridness and to become almost similar to the poison of rabies. Departing from this theory, the author declares it to be necessary to mitigate the irritation produced on the gums and other parts of the mouth by the altered condition of the saliva, as well as to modify the quality of the saliva itself and to promote the elimination of the same from the body by emetics and aperients. According to him, liquid carbonate of potash administered in drops, together with syrup of poppy heads, manna, etc., is a most useful remedy, having specially for its effect to diminish the acridness of the saliva.

Besides this remedy, the author extols the use of blisters behind the ears, as also of tepid baths, which calm pain and spasms, favor the excretions, and procure repose and sleep. He rejects the incision of the gums as altogether useless, and is most opposed to the use of opium, which he states renders children liable to apoplexy.

And here we will mention, rather by way of curiosity than for any real historical interest which they possess, two pamphlets on *odontitis*, published respectively in 1791 and 1794 by Ploucquet and Kappis, who maintained that not only the dental pulp, but all the parts that form the tooth are susceptible of inflammation.[2] In Kappis' pamphlet we find the following ideas developed, upon which we do not think necessary to comment. The inflammatory process consists essentially in the increased flow of humors to a given part and in a more or less intense reaction of the vital force. Both of these things may take place in the teeth. These are liable to swell, that is, to undergo an increase of all their dimensions, in proof of which assertion the author relates the case of an individual, who when attacked by a violent toothache had found the spaces between his teeth so narrowed that it was no longer possible to make use of his

[1] Uebersicht der Chirurgischen Instrumente.

[2] Ploucquet, Primæ lineæ odontitidis, sive inflammationis ipsorum dentium, Tubingæ, 1791; Kappis, Primæ lineæ odontitidis, etc., Tubingæ, 1794.

usual toothpick, even if he had tried to do so regardless of pain. But when the toothache was over, the same toothpick again became serviceable as before. He says that there is no cause for wonder that in odontitis no redness of the teeth is to be perceived, for in other inflammations as well, redness is wanting, and, moreover, it exists in the interior membrane of the tooth. As in other inflammations, so also in odontitis, the usual issue is resolution. Dental fistulæ may derive from internal suppuration. The impurities deposited on the teeth are by him supposed to be owing to an increase of their secretion! According to the author, caries, the breaking down of teeth apparently healthy, as well as their falling out, is generally caused by an inflammation of these organs, that is, by odontitis, an affection that, he says, may be of very varied kind, the principal forms being the rheumatic, arthritic, sympathetic, and gastric.

RANIERI GERBI.[1] In a book by this author we find recommended a very singular cure for toothache, even of the most violent nature. It is in no way scientific, and is besides not particularly pleasant, notwithstanding that the author, professor at the University of Pisa, was a scientist of merit, enjoying special esteem as a mathematician and cultivator of natural sciences.

Under the name of *curculio anti-odontalgicus* he describes an insect living habitually inside the flowers of the *carduus spinosissimus*, that could be used with great advantage against toothache, in the following manner: One crushes fourteen or fifteen larvæ of the insect between the thumb and forefinger, and then rubs the two fingers together until the matter remaining upon them is entirely absorbed. Instead of the larvæ (which, as is known, represent the first stage of insect life) one may also use the fully developed insects. One then applies the two fingers that have crushed the insects or their larvæ upon the decayed and aching tooth. If the pain is of a nature to be cured by this means, it diminishes almost instantaneously, and ceases altogether in a few minutes. It is said that the fingers preserve their healing power for a great length of time, even a whole year, and in proof of these assertions Ranieri Gerbi speaks of no less than six hundred cures performed! Other insects besides the *curculio anti-odontalgicus*, used in the same manner, are said to possess the same curative properties, among them the *curculio jaceæ*, *carabus chrysocephalus*, and the *curculio Bacchus*, which last, says Gerbi, has long been used for this purpose by the peasants of Tuscany. The author also says that some German doctors and naturalists experimented with success with several insects indigenous to Germany as remedies against toothache. These insects, also mentioned in a work published in Bayreuth in 1796, author unknown, are:[2] the *coccinella septempunctata*,

[1] Storia naturale di un nuovo insetto, Firenze, 1794.

[2] Der anfrichtige Lahnarzt.

the *coccinella bipunctata*, the *carabus ferrugineus*, the *chrysomela sanguinolenta*, the *chrysomela populi*, the cantharis or Spanish fly, and others. Later on, Hirsch also extolled the healing power of another insect, the *cynips rosarum*. With regard to the mode of application, Gerbi says that instead of crushing and rubbing these insects or their larvæ between the fingers, one can use a piece of wash leather in a similar manner.

It is to be observed, however, that the insects that are found generally in the ripe wild teasle—or more precisely their larvæ—had already been used for a long time as a remedy against toothache; indeed, we even find these means of cure recommended in the natural history of Pliny. In a book entitled *Histoire d'un voyage aux îles Malouines fait en* 1763 *et* 1764, by a certain Dom Pernetty, this author speaks of some remedies made known to him by the Superior of the Franciscan friars of Montevideo; and among others one finds the following: "One draws out the worm that is generally found in the head of the fuller's teasle when this is ripe. One rolls this worm between the index finger and the thumb, lightly pressing it until it dies of languor. The one or the other of the two fingers applied on the aching tooth will have the virtue, for a year at least, of making the toothache cease."[1]

Heinrich Callisen, in an excellent treatise on surgery[2] published at Copenhagen in 1788, writes at sufficient length and with great accuracy on dental and maxillary diseases. According to this writer, it rarely suffices to trepan one alveolus for the treatment of the morbid collections of Highmore's antrum, as the maxillary sinus is very often divided by partitions into various cells, so that in order to give exit to the pus contained in each of them, it is necessary to extract several teeth and trepan their alveoli.[3] One ought not, therefore, to give the preference to this method, unless in the case of the teeth in question being decayed. But should they all be in a good state, or should a large opening be necessary because of the nature of the disease in the cavity, it will be better to follow Lamorier's method, that is, to incise the gum crosswise under the malar process and then, after scraping away the periosteum, trepan the bone. Further, in the case of the disease in the maxillary sinus having given rise to tumefaction, softening of the bone, and fluctuation in the palatine region, it is precisely there that the perforation ought to be carried out. To prevent the reclosing of the opening before the cure is completed, the author advises the use of pledgets, small bougies, a piece of prepared sponge, or even a small tube. According to Callisen,

[1] Without comment!

[2] Principia systematis chirurgiæ hodiernæ.

[3] The anatomical fact alluded to by the author, far from presenting itself very often, as he says, is of rare occurrence, and cannot be held in account for establishing a general operative rule.

the injections through the nasal orifice of the maxillary sinus are partly impracticable, and partly of no utility.

It always does more harm than good to file or to scrape the decayed part of a tooth, without stopping it afterward, as by thus doing, says the author, one only renders it still more liable to the access and the action of harmful external influences. In preparing the cavity for stopping, the bottom of it should be more ample than its external aperture, that the filling may remain firm.

For extracting molars, he makes use either of the pelican or of the key; for the incisors and the canines, of the forceps; and for roots, of the goat's foot.

Callisen treats incipient *idiopathic* epulis by destroying it through cauterization, after having covered the teeth with wax; if the epulis be large and more or less hard, he removes it with the bistoury; as to *symptomatic* epulis, he holds the removal of the original cause to be the best mode of treatment.

This author declares himself decidedly in favor of replantation and transplantation, expressing the idea that these methods are always to be preferred to the application of artificial teeth. He maintains that after a tooth has been replanted, and its consolidation has taken place, there is no possibility of any further pain, the nerve being broken. The author relates a brilliant cure which he carried out upon a lieutenant, who, during the siege of Copenhagen, had received a blow that had sent all his front teeth into his mouth. Callisen immediately put them all back in their places with such ability that they became perfectly firm again. With reference to transplantation, he only believes in its being possible for teeth with a single root.

In works published toward 1790, Lentin and Conradi, devoted their particular attention to the morbid conditions that produce looseness and spontaneous falling of the teeth. For the treatment of these conditions Conradi recommended general and local remedies. The general remedies were directed to the suppressing of acridness in the blood, which he considered to be an etiological element of primary importance. As to the local remedies, they ought specially to consist in keeping the teeth clean by the use of a toothbrush, in painting the gums with tincture of catechu and myrrh, and in rinsing the mouth frequently with a decoction of cinchona or of willow bark. Against toothache caused by caries, he particularly advises essence of cloves, introduced into the carious cavity on a piece of cotton-wool.[1]

Friedrich Hirsch was much less disposed than were many of the preceding writers to incision of the gums in cases of difficult dentition.

[1] Sprengel, pp. 372, 373.

Against the accidents connected with this morbid condition, he prefers, in general, the use of gentle aperients or of emetics, and regards the scarification of the gums as opportune only in cases where symptoms indicating a high degree of nervous tension manifest themselves.

Against incipient caries, Hirsch used simple cauterization, which he held to be capable of arresting the morbid process, at least in many cases. He says, however, that when a real carious cavity exists, it is absolutely necessary to stop it; and for this purpose, rather than metallic or resinous fillings, he prefers a cement of turpentine and quicklime, made into a paste with varnish of oil of linseed. Nevertheless, when it is a case of the lower teeth, tin-foil is also, according to him, an excellent filling material.

Like some of the preceding authors, Hirsch admitted the existence of *interior caries* in apparently healthy teeth, and was the first to indicate a good mode of diagnosticating these occult dental affections. It consists in tapping the suspected teeth with a sound until one finds the one in which the percussion provokes pain, and this will be the diseased tooth. One detaches the gum from the neck of this tooth, and at the point, on the neck itself or on the beginning of the root, where a small protrusion is found, one perforates the tooth with a chisel, or some other fit instrument, so as to penetrate to the interior of it. Through this passage one introduces into the tooth a fine, curved, red-hot sound, repeating the operation several times. Lastly, one fills the cavity with lead; and in this manner the tooth will be cured and no longer painful.

In speaking of the correction of dental anomalies, Hirsch relates a case in which the deformity consisted in the union of two central incisors, which formed one single piece, resembling a paddle, and spoiled the appearance of the face. He divided them with a saw, cauterized the surfaces of the section, scarified the gum, and, to gain a little space, introduced a small wedge, until the gum had grown up within the new dental interstice, thus giving an altogether normal appearance to the part.

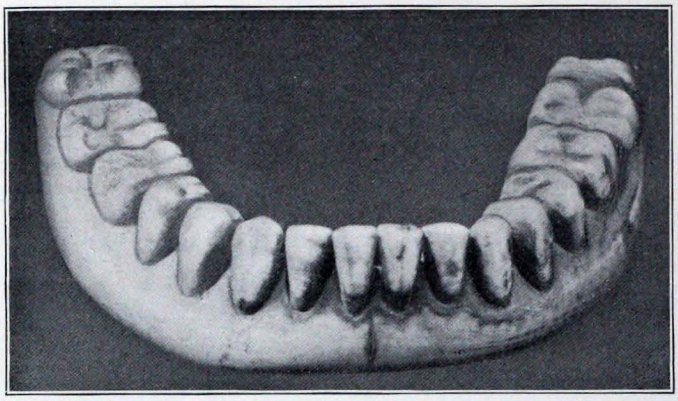
It is noteworthy that Hirsch made use almost exclusively of the goat's foot for the extraction of teeth, of whatever kind they might be, the instrument being rather longer, however, than that ordinarily known by this name, and making his left hand serve as a lever rest.

To arrest strong hemorrhage ensuing from the extraction of teeth, Hirsch used scraped parchment, which he introduced into the alveolus and pressed with force into it by means of a sound; then he superposed compresses and kept the jaws tight together with a bandage passed around the head.

This author, too, was very favorable to replantation. As to transplantation, he says that even when the gum and the alveolus are quite healthy, the individual entirely free from scurvy and syphilis, and not

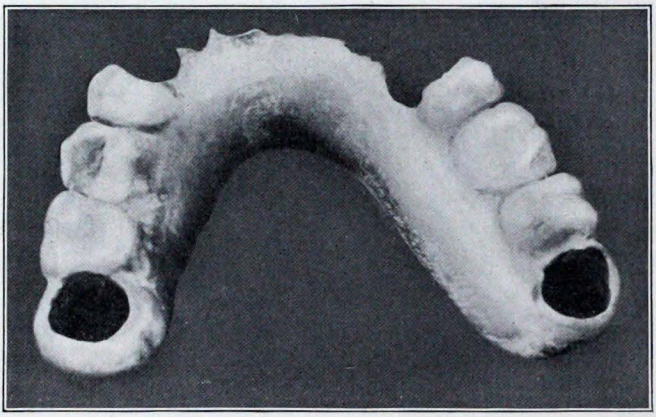
above fifty years of age, the transplanted teeth do not take root perfectly except in an average of one case in three. For carrying out this operation he never made use of teeth extracted from the mouth of a living person, but, on the contrary, he used the teeth of young and healthy subjects

FIG. 102



Full lower set in hippopotamus ivory, with human front teeth; seventeenth century. (From Guerini's collection.)

FIG. 103



Upper denture in ivory, at the end of the eighteenth century, for a case in which the last molars and the front teeth were present. (From Guerini's collection.)

who had died a violent death; these were, besides, carefully cleaned before transplanting them, and in this way the author believed the transmission of disease to be nearly impossible.[1]

J. E. WICHMANN combated energetically the practice, then pretty general, of endeavoring to facilitate the eruption of the teeth by

[1] Hirsch, Praktische Bemerkungen über die Zähne und einige Krankheiten derselben, Jena, 1796.

incision of the gums. He considered this practice as one to be absolutely rejected, supporting his opinion on the consideration that dentition, being an altogether physiological process, which, moreover, takes place in parts relatively of but little importance, never can give rise of itself alone to serious accidents. Besides this, he says, it is very difficult to say which tooth precisely is about to erupt and at what point. The incisions would, therefore, have to be made by chance, which would often render the morbid condition still more serious.

K. A. BLUMENTHAL endeavored to confute Wichmann's opinions, with but little success; for, indeed, the same opinions, expressed later by J. H. Sternberg in a more detailed manner and with ampler views of the subject, met with ever-increasing approval. Thenceforth, the practice of gingival incisions in cases of difficult dentition fell more and more into discredit.[1]

ROBERT BUNON,[2] the French dentist, is one of the most illustrious personalities to be met with in the history of our profession. He was born at the beginning of the eighteenth century, and devoted himself betimes to the dental art, gathering instruction therein partly from different dentists and partly from the few odontological books he was able to find. In this manner he learned pretty much all that was known at that time by dentists in general. He then decided to travel, in order to acquire further knowledge and experience. He practised especially in the north of France and in what is now the state of Belgium; at Antwerp, Brussels, Givet, Maubeuge, Cambrai. In his ardent thirst for knowledge, when he happened to pass through a town where some dentist of note resided, he never neglected to call on him, thus acquiring fresh information and perfecting himself as well in the practical exercise of his profession. At the same time, his desire to learn all that was new concerning dental art and science was so intense that he had translations made of the medical and surgical works of Latin, Italian, German, and English authors. However, all this reading, although it enlarged his general knowledge, taught him nothing, or almost nothing, about those subjects that interested him above all the others. His practical experiences, meanwhile, brought a great number of patients to his notice, and, being by nature a very acute observer, he was able to establish the existence of many facts up to then unknown. At this time he commenced his studies on dental erosion, on the development of the teeth, and on the prophylaxis of dental maladies, his favorite subject. "I felt," he writes, "that the necessity of having recourse day by day to the extraction of teeth resulted from

[1] Sprengel, pp. 376, 377.

[2] For all that regards Bunon's life and writings we have availed ourselves of the excellent historical work of A. Barden, "Un précurseur: Bunon," a communication presented to the Geneva Session of the International Dental Federation (August, 1906).

deficient knowledge on our part, and I considered this extreme remedy as one of the greatest evils to humanity."[1] He therefore endeavored to extend his own knowledge in every possible way, and as one means of doing this he visited hospitals and schools; and, ardent champion as he was of conservative dentistry and of prophylaxis, he succeeded in interesting medical men and surgeons, midwives and schoolmasters, and parish priests as well, in the question of the preservation of the teeth. The teeth he extracted he kept for the purpose of studying the conformation, the lesions, the dental anomalies; sometimes he split them up to examine the dental pulp. And he never neglected an opportunity of procuring anatomical pieces that appeared interesting to him.

In 1728 Fauchard's book, *Le Chirurgien Dentiste*, appeared. The fame of this work reached Belgium, where Bunon then was, and he immediately set about trying to get a copy of it. After searching in various towns, he finally found one in Givet. He read it with the greatest interest, and later, in one of his works, spoke of it in terms of highest praise. It would seem, however, that he did not learn much that was new to him by reading this book, which proves that he already possessed a vast odontological culture and was also profoundly versed in technical dentistry, which forms the most important part of Fauchard's book. He was somewhat astonished at finding in this celebrated author's work hardly anything on the subjects that principally interested him, that is, the erosion, the development of the teeth, and the prophylaxis of caries. This circumstance very clearly reveals the different mental tendencies in these two great men, the one, drawn toward the practical side of the profession which principally interests him and forms the basis of his work, the other, an impassioned searcher into causes, and student of prophylaxis.

After the perusal of Fauchard's book, Bunon, who had already conceived the idea of publishing the results of his observations and of his own particular studies, felt more than ever the propriety and necessity of doing so; and to realize his idea, he established himself toward the year 1735 at Paris. Two years later, just when the manuscript of his work was almost finished, Gerauldy's book appeared. Bunon relates that he opened this book in fear and trembling; its title, *The art of preserving the teeth*, gave him reason to fear that Gerauldy might have profited by some of the ideas and observations he had communicated to various persons, to write a book similar to the one that he himself had it in his mind to publish.[2] He was able, fortunately, to convince himself immediately that his fears of being forestalled and plagiarized were unfounded.

Notwithstanding, Bunon was determined not to publish his book until the opportune moment and with all possible probability of success. With

[1] Expériences et démonstrations, p. 13.

[2] Ibid., p. 60.

this object in view, he made up his mind first to obtain the diploma of surgeon-dentist. To reach this aim, he was obliged to conform to the regulations of the *Edict of May*, 1699, which then regulated the practising of dentistry, and this was as much as to say that he was obliged to enter the College of Surgery, to undertake two years' practice with a regularly licensed surgeon, to undergo theoretical and practical examinations, and to take oath before the Chief Surgeon of the Realm. Once in possession of the diploma of surgeon-dentist, he was separated thenceforward from the vulgar crowd of charlatans and invested with all the prestige which a degree, so rarely acquired at that time, conferred upon its possessor; but before facing public opinion he desired to make himself known, and, so to say, first to try his ground, by making known some of his newer ideas, and see what reception they might meet with from his colleagues and the public in general. He, therefore, published, in January, 1741, in the newspaper *Mercure de France*, a letter on the so-called *eye tooth*,[1] combating the then widely diffused prejudice that the extraction of an upper canine constituted a grave peril to the eye. He demonstrated the absurdity of this idea by putting in evidence the anatomical fact that the upper canines are innervated by the infra-orbital nerve, which has no relation whatever with the visual organ.

Still better to further his object of making himself a name, he published in the same year and in the aforementioned paper his dissertation on the teeth of pregnant women.[2] There he demonstrated the falseness of the idea that one ought never to extract teeth during the state of gestation, and brought into relief the necessity of treating the dental diseases of pregnant women with still more accuracy than those of other persons.

These publications, bearing as they did the marks of good sense, favorably interested the public opinion. The way was therefore prepared, and Bunon judging the moment to have come for publishing his work, placed it in the hands of a literary man for the necessary corrections of style. He also showed his manuscript to several persons of consideration, but was grieved to perceive that the new ideas put forward in it were skeptically received. He now thought it might be as well to appeal to the judgment of a highly competent authority, and fixed on M. de la Peyronie, Head Surgeon of the Realm. This gentleman, after reading the work, highly praised the author, and Bunon gained permission to publish the book under his patronage, on consideration that he should give his word to furnish the proof of the many assertions made therein on all kinds of subjects.

[1] Lettre sur la prétendue dent œillère.

[2] Sur un préjugé très pernicieux, concernant les maux de dents qui surviennent aux femmes grosses.

The goal was now reached, and Bunon, on the strength of such illustrious patronage, published his book in March of 1743, under the title, *Essay on the maladies of the teeth, wherein are suggested the means of obtaining their good conformation from the earliest age, and of assuring their preservation during the whole course of life.*[1]

All the principal journals of the time (*Journal des Savants, Journal de Trévoux, Journal de Verdun, Mercure de France*, etc.) published extracts from the book and eulogized the author, who had even the high satisfaction of receiving an honorable mention from the Royal Academy of Surgery, in the public sitting held in 1743.

Bunon, therefore, was now famous, and had, besides, gained wealthy clients, as we see from the perusal of his observations, where the best names in France are to be met with, put in evidence by him without the least thought of professional secrecy. He could now enjoy his well-merited successes, in accordance with the thought expressed by him in one of his books: "All those who labor for the progress of an art have legitimate right to the honor and to all the recompenses to which success is entitled."[2]

The study of Bunon's work proves, in fact, that he had good right to be proud of having written it. The mere perusal of it, however, does not suffice to enable the reader to judge of its merits, for to do this properly, it is necessary to study at the same time his other book, published in 1746, entitled *Experiences and demonstrations made at the Hospital of Salpêtrière and at St. Côme, before the Royal Academy of Surgery, serving as continuation and proof to the Essay on the maladies of the teeth.*[3] The essay is, in fact, a small 12mo book of 212 pages, written in a concise style, and, strange to say, most concise in the most important points.

Many facts of great moment are given under the form of rapid indications, or of assertions without proof; thus their importance is apt to pass completely unobserved by those who do not take the trouble of studying this work thoroughly and with the help of the explanations, illustrations, and comments contained in the second book we have referred to.

M. A. Barden, of the École Odontotechnique of Paris, was the first to undertake a serious and conscientious study of Bunon's works. By so doing he has thrown full light on the author's great merits, and brought forward the high scientific importance of his works.

[1] Essai sur les maladies des dents, où l'on propose les moyens de leur procurer une bonne conformation dès la plus tendre enfance, et d'en assurer la conservation pendant tout le cour de la vie.

[2] Expériences et démonstrations, avertissement, p. xix.

[3] Expériences et démonstrations faites à l'Hôpital de la Salptêrière et à St. Côme, en presence de l'Académie Royale de Chirurgie, pour servir de suite et de preuves à l'Essai sur les maladies des dents.

One of the important questions studied by Bunon concerns the hygiene to be observed in order to obtain the development of a good dentition. On this question he rightly establishes the principle that hygiene and dental prophylaxis should begin from the period of the formation of the milk teeth. He works out this principle with rigorous logic, and finishes by tracing the hygiene of the mother during pregnancy, of the woman (be she mother or nurse) during the nursing period, and of the nursling as well.

As to the accidents of first dentition, Bunon sets forth a highly scientific opinion, fully coinciding with the ideas of modern writers, that is, that dentition is not the sole cause, nor even the principal cause, of such accidents, but simply a coöperating cause. He made the observation that in healthy infants, children of healthy parents and nursed by healthy women, the time of teething is gotten over without difficulty, while serious accidents occur frequently in weak and sickly children not brought up and nourished according to hygienic principles, or born, as not often happens, with special hereditary predispositions.

One of Bunon's merits is that of having attributed to the first teeth all the importance they really have, and of having insisted on the necessity of attentively curing their maladies. He also drew attention to the dangers that may result from the eventual persistence of the first teeth at the epoch of the second dentition, or from the persistence of their roots after the destruction of the crown by caries. These roots, he says, by their contact with the neighboring permanent teeth may infect them, and cause them to decay.

Bunon's researches into the development of the teeth enabled him to describe precisely the position that the various teeth of the second dentition occupy in the jaw with regard to the milk teeth, before these are shed.

Bunon was, besides, the first author who studied accurately dental hypoplasia, and it is greatly to his honor that his ideas and observations about this pathological condition have been accepted and confirmed in substance by the greater part of the authors who have come after him, having remarkable worth even at the present day. According to him, this congenital defect of the teeth is owing to infantile maladies, such as hereditary syphilis, infantile scurvy, malignant fevers, smallpox, or measles; the harmful effects of these maladies, however, are limited to the teeth in progress of development, and have no influence on those that have already come forth. Erosion, as this defect was termed by Bunon, sometimes affects the first teeth, but is to be found much more frequently in the second or permanent ones. Those most often affected are the first molars, and in frequency follow the incisors, the canines, the premolars; the second and third molars are the most rarely affected.

Bunon studied with great accuracy the means of preventing anomalous positions of the permanent teeth, owing, according to him, almost always to want of space. In certain cases he advises the extraction of the milk tooth in order to facilitate the eruption of the permanent one, and, necessity urging, he does not hesitate to sacrifice one of the permanent teeth to procure the advantage of a normal position of the others. With regard to this subject, the following passage is worthy of note, for in it we find sketched out the theory of preventive extraction as a means of facilitating the eruption of the wisdom tooth: "It is better to have the teeth incomplete as to number than to have the ordinary number badly arranged; for the mouth will appear none the less well furnished because of having one or two teeth the less; the other teeth will be commodiously distributed, and the last molars will find sufficient room when they come forth; thus, the disorders which these teeth often occasion will be avoided."[1]

After caries, Bunon considers dental tartar as the most potent enemy to the vitality of the teeth. He distinguishes three principal species: the black, the lemon or light yellow, and the brownish yellow; however, he allows of two other varieties of less frequent occurrence, the red and the green tartar.

At a period when an extraordinary confusion obtained with regard to gingivitis, because of the great number of varieties allowed, Bunon strongly affirms the unity of this morbid process, and considers tartar as the constant cause of it, without denying, however, that other causes of various kinds may contribute at the same time to produce it.

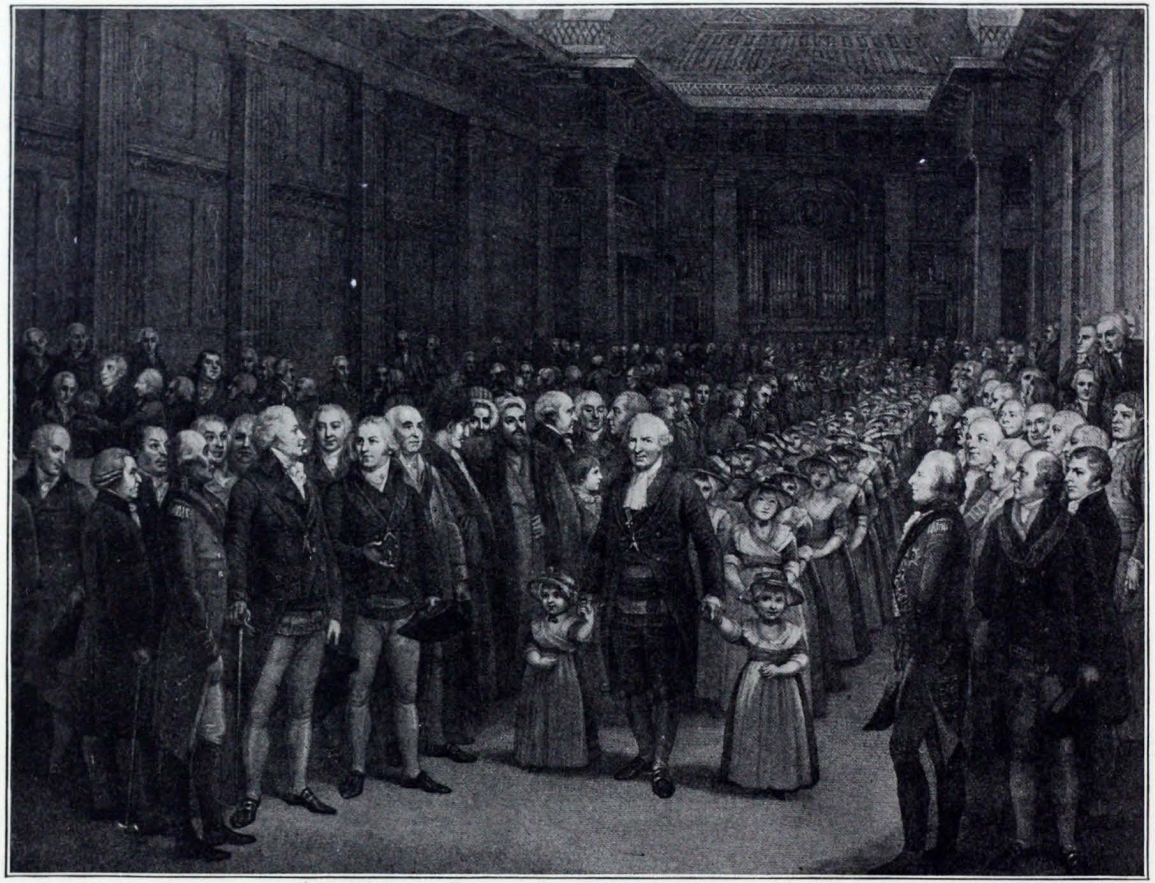
In cases of scorbutic stomatitis, Bunon advises, and very rightly, the complete removal of tartar from the teeth before having recourse to any other local treatment. He also insists on the necessity of attending to the teeth and gums, and especially of freeing the former from tartar before undertaking the specific treatment of syphilis, considering the good state of the teeth and gums as one of the most important prophylactic measures against mercurial stomatitis.

Anyone who takes the trouble of reading Bunon's works attentively cannot help admiring his depth of insight, his spirit of observation, his exquisite clinical sense, and his ingenuity. As illustrating this last quality of his, we may cite two cases of fracture of the lower jaw that he succeeded in curing in a short time by the method of binding the teeth, the preceding attempts of experienced surgeons having entirely failed. One of these cases is particularly interesting. The seat of the fracture corresponded with the bicuspids, which, however, had fallen out from the effects of trauma; the neighboring teeth were also loosened. Bunon filled the empty space left by the bicuspids with a piece of ivory, provided with two holes;

[1] Essay, p. 127.

RUSPINI WITH HIS FAMILY IN A COUNTRY PLACE

From an old painting in oil.



The Italian dentist Ruspini presenting the children of his orphanage to the members of the Free Masons Hall in London, with whose aid the institution had been founded.

then, by an ingenious crossing of threads passing from the second molar on the one side to the second bicuspid on the other, very tightly tied, he formed, so to speak, one single block, and succeeded in bringing about the consolidation of the shaking teeth and the complete cure of the fracture, which was effected in less than a month.

The unfavorable judgments passed on Bunon by some writers result, in a great measure, from the circumstance that one finds quoted in his books certain modes of treatment that today appear positively ridiculous. But those who, very wrongly and with deplorable levity, consider Bunon as nothing more than a vulgar empiric, ought to reflect that even the greatest men cannot altogether avoid the influence of the ideas and the prejudices of their time. Some tribute they are almost fatally bound to pay to these prejudices. It is, therefore, not to be wondered at, if one finds in Bunon's works, as well as in those of many other old writers, indications given of more or less strange remedies. Thus, as facilitating the eruption of teeth, he recommends among other remedies the rubbing of the gums with a mixture of honey, fresh butter, hare's brains, and oil of lilies, or with the fat of an old cock, dog's milk, and pig's brains. Against the disorders and dangers of the teething period he also advises rubbing the nape of the infant's neck, the shoulders, the back, and the lower limbs, always taking care, however, to rub from above downward, thus offering opposition to the flow of humors toward the upper parts of the body.

These means and methods of treatment reflect, so to speak, the medical ideas and the curative practices of that time, and come down, in part, from remote ages, as evidently appears from what is said in different parts of this book. But such small blemishes ought certainly not to be taken into account in passing judgment on Bunon's works, the most substantial part of which is made up of very original ideas and observations. The high intrinsic value of Bunon's works gives him a just right to be considered one of the most illustrious forerunners of modern scientific dentistry.

Bartolomeo Ruspini, an Italian dentist, exercised his profession in London with great success for more than thirty years. He was patronized by all the greatest personages of the Kingdom and also by the Royal family, from whom he received special marks of distinction. He attained a very conspicuous position, and with the aid of the London Freemasons' Lodge, of which he was an influential member, but chiefly by the results of his professional work, he was able to found an orphanage that was called by his name, being moved to do this by his great love for children, whose dental maladies and disorders had always been an object of particular study for him. In 1768 he published *A Treatise on the Teeth, Their Structure and Various Diseases*. This book was remarkably well received and went through a number of editions, the last in the year

1797. Ruspini did not, in reality, contribute very much to the development of dental science. He is, however, to be especially remembered as the inventor of a very good mouth mirror, a means of examination which afterward gradually came into general use.

Having brought our history of dentistry up to the end of the eighteenth century, in order to complete our work we must now speak of an innovation in dental prosthesis, which, although gradually brought to perfection in the following century, was first introduced at that time. We allude to the

INVENTION OF MINERAL TEETH.

The merit of this invention is due, in part, to an individual outside the dental profession, namely, to the French chemist Duchâteau, of St. Germain en Laye, near Paris, who first had the idea of employing porcelain as material for dental prosthesis. However, his idea would not have yielded fruitful results had it not been for the coöperation of the dentist Dubois de Chemant, who succeeded in putting it into practice.

The circumstances connected with this invention were the following: The chemist Duchâteau had for some time worn a denture of hippopotamus ivory, but as usually happened with all the prosthetic pieces of that time, which were made of organic material, and were, therefore, subject to decay, this denture had acquired a very disagreeable odor, resulting from the action of the buccal humors. Besides which, Duchâteau being obliged, by reason of his profession, to continually taste pharmaceutic preparations, his denture had gradually become impregnated with medicinal substances that imparted a nauseous taste to everything he ate. The unpleasantness of this was a subject of much consideration with him, and thus it was that, to remedy the evil, he gradually matured the idea of having a porcelain denture made, on the model of the ivory one. In the year 1774 he applied to the porcelain manufactory of M. Guerhard in Paris for the carrying out of his design. The first trial was not successful, for in the baking the paste contracted so much that the denture was no longer of the right dimensions. To remedy this, he now had another and larger denture made, to allow for its contraction in the baking. But the results did not correspond with his wishes, and many trials were still necessary before Duchâteau was able to obtain a denture which he judged fit for use, although not without defects. As this denture, because of its dead whiteness, produced an unpleasant effect, he had a yellowish tint, resembling that of the natural teeth, given to it, and, as is usual with painting on porcelain, fixed this color by baking a second time.

However, this denture proving unserviceable, Duchâteau was obliged to put it aside and begin new experiments. These were made with a special kind of porcelain paste used in France for the first time in 1740, which vitrified in baking at 12° to 25° by Wedgwood's pyrometer, whilst the usual porcelain required a temperature of 72° to 75° by the same test; but the results thus obtained were no better than the preceding ones, and upon these new failures Duchâteau applied to the dentist Dubois de Chemant, of Paris, for his collaboration. Together they made fresh attempts, modifying the composition of the paste by adding a certain quantity of pipe clay and other coloring earths to it. These modifications enabled them to carry out the baking of the pieces at a much lower temperature, and after various experiments the final result was a denture that fitted the gums well enough, and which, in point of fact, Duchâteau was able to wear.

Encouraged by this success, he tried to manufacture like dentures for personages of high rank, hoping to gain money thereby, but his want of knowledge of the dental art prevented him from succeeding in his undertaking. However, in 1776 he laid this new process before the Royal Academy of Surgeons in Paris, receiving the thanks of that body as well as an honorable mention.

Whilst Duchâteau, discouraged by failure, was giving up all idea of deriving profit from the practical application of his invention, Dubois de Chemant, on the contrary, did not cease working for a moment, in order to bring the new method of prosthesis to perfection. Little by little he introduced important modifications into the composition of the mineral paste used in the manufacture of the dentures, incorporating therewith Fontainebleau sand, alicant soda, marl, red oxide of iron, and cobalt. His experiments and researches aimed at three principal ends, viz.:

1. The obtaining of mineral teeth offering all the gradations of color presented by natural ones.

2. The arriving at a rigorous calculation of the contraction of the mineral paste in the baking, so as to be able to make prosthetic pieces of the desired form and dimensions.

3. The perfecting of the means of attachment of the prosthetic pieces, and, in particular, of the springs.

By working with intelligence and perseverance, Dubois de Chemant gradually obtained satisfactory results, and when, in 1788, he published his first pamphlet on mineral teeth, he had already made dentures and partial prosthetic pieces for a certain number of persons, who wore them to great advantage.

As to the chemist Duchâteau, from 1776 to 1788, that is, during the twelve years subsequent to his communication to the Academy of Surgeons, he did absolutely nothing at all. He is, therefore, entitled to the

credit of having had a happy idea and of having endeavored to put it into practice; but the merit of having given life to the idea, abandoned for so many years by him with whom it originated, is exclusively due to Dubois de Chemant; he is, therefore, with reason considered the true inventor of mineral teeth.

Dubois de Chemant, however, was so unjust as to take the whole credit of the invention for himself, declaring in his writings that the original idea had been exclusively his own, and was in no way due to Duchâteau.

In 1789 Dubois de Chemant made his invention known to the Academy of Sciences and to the Faculty of Medicine of Paris; both pronounced in favor of it, and in consequence of the opinion given by such high authorities, he soon after obtained an inventor's patent from Louis XVI.

Dubois' successes now aroused the envy of many of his colleagues, and especially of Dubois Foucou, the king's dentist, who, together with the greater part of the dentists of Paris and the chemist Duchâteau, brought an action against him, accusing him of having usurped the invention of Duchâteau, and demanding, for this reason, the annulment of the inventor's patent that had been granted him. But the law courts, in an opinion dated January 26, 1792, rejected the demand for annulment, recognized the patent of invention as fully valid, and condemned Dubois Foucou, Duchâteau, and their confederates to the costs of the judgment.

Paris being at that time in full revolution, Dubois de Chemant was induced to emigrate to England. He established himself in London, and there obtained a patent without much difficulty, according him the exclusive right, for fourteen years, of manufacturing dentures of mineral paste.

Dubois de Chemant wrote several pamphlets in order to make known to the public this new kind of dental prosthesis and its advantages; some of these were published in Paris (1788, 1790, 1824), and others during his long residence in London, where he remained from 1792 to 1817. In these pamphlets he upholds the great superiority of "the incorruptible teeth of mineral paste" over all other kinds of artificial teeth; he calls special attention to the fact that teeth of bone, ivory, and of every other organic substance whatever gradually become spoilt through the action of the saliva, of oral heat, of food and drink, etc., and not only lose their primitive color and assume a dirty hue, most unpleasant to the eye, but acquire a bad odor, at times quite insupportable, becoming, besides, a cause of irritation to the gums and the mucous membrane of the mouth, not to speak of their gradual softening and wearing out, which renders them unserviceable after a certain time. All these disadvantages were avoided by using the new prosthetic material, this being incorruptible and inalterable.

The prosthetic appliances by Dubois de Chemant were made in one single piece that represented the gums and teeth, whether in the case of one or more teeth, or of whole dental sets. He used to take a cast of the parts on which the prosthesis was to be applied, and by a process, the details of which are not known; he succeeded in obtaining prosthetic pieces that fitted the parts perfectly, notwithstanding the difficulties resulting from the shrinking of the paste in baking. If the piece required retouching, he did this by means of special tools for grinding down porcelain. He could, besides, drill holes in the porcelain for the application of the means of attachment. In fact, Dubois de Chemant was the creator of a new method of prosthesis applicable to any and every case, and which gained the praise and admiration of the great doctors and scientists of that day, among whom may be mentioned Geoffroy, Vicq d'Asyr, Descemet, Bajet, Petit Radel, Darcet, Sabatier, Jenner, and others. The Paris Faculty of Medicine gave it as their judgment that the prosthetic pieces manufactured by Dubois de Chemant united the qualities of beauty, solidity, and comfort to the exigencies of hygiene.

These eulogies must, however, be received with a certain reserve, as, beyond doubt, the mineral teeth of that time still left much to be desired. In England, where, as we have already said, they had been introduced by the inventor, they at first obtained a great success, which was, however, of short duration, and Maury[1] tells us that toward 1814 they had fallen into great discredit and had been entirely abandoned; this signifies that practically they did not fulfil the expectations held out.

Dubois Foucou and Fonzi. Among the first who occupied themselves with the manufacturing of mineral teeth, contributing also to their improvement, are to be named Dubois Foucou, to whom we have already made reference, and Fonzi, an Italian by birth, who exercised the profession of dentist in Paris. Dubois Foucou made some improvements in the coloring of porcelain teeth, and in 1808 published a pamphlet in which he explained his mode of proceeding in manufacturing them.[2] In the same year Fonzi made known a new kind of teeth,[3] which he called *terro-metallic*. These differed from those of Dubois de Chemant in that they were all single teeth intended to be applied on a base by means of small hooks of platina, with which each tooth was furnished. In addition to this important innovation, Fonzi also discovered the means of imitating in some degree the semitransparent tint peculiar to natural teeth.

[1] F. Maury. Traité complet de l'art du dentiste, d'après l'état actuel des connaissances, 2 vols., Paris, 1828.

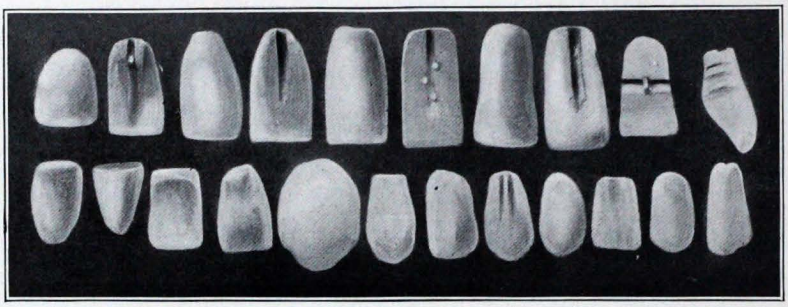
[2] Exposé de nouveaux procédés pour la confection des dents dites de composition, par M. Dubois Faucou, Paris, 1808.

[3] Rapport sur les dents artificielles terro-metalliques, Paris, 1808.

Notwithstanding this, the teeth made by Fonzi, of which there are still some specimens in various dental museums, had anything but a good appearance, and there still remained much to be done before mineral teeth reached the height of perfection which they attained later on.

The credit of having introduced many new improvements in the manufacture of mineral teeth belongs especially to the Americans. Among those who particularly distinguished themselves in this department of dental art, we may note Charles W. Peale, Samuel W. Stockton, James Alcock, and Dr. Elias Wildman. But the most brilliant results, as is

FIG. 104



Earliest specimens of mineral teeth.

well known, were obtained by the celebrated Samuel S. White, who, by an intelligent and persevering activity, dedicated almost exclusively to improving mineral teeth and to bringing them into general use, contributed vastly to the progress of modern dental art. Samuel S. White undoubtedly stands forth as one of the noblest and grandest figures in the history of dentistry, and his name will ever be recorded with honor and veneration by dentists of all ages.

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