Causes of irregularity of the permanent teeth : their mechanical treatment considered / by James Robinson.

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CAUSES OF

IRREGULARITY

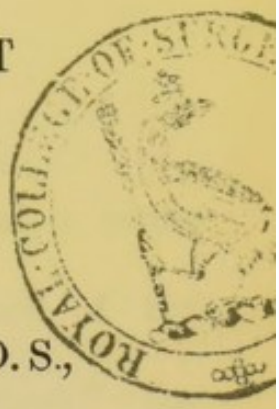
OF

THE PERMANENT TEETH:

THEIR

MECHANICAL TREATMENT

CONSIDERED.



By JAMES ROBINSON, D.D.S.,

Senior Dentist to the Royal Free Hospital, &c.

AUTHOR OF

"SURGICAL AND MECHANICAL TREATMENT OF THE TEETH;"

"THE INHALATION OE ETHER AND CHLOROFORM;"

"ON THE EMPLOYMENT OF IMPURE GOLD FOR DENTAL PURPOSES," &c.

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PREFACE.

HAVING communicated to a Dental Periodical a series of papers upon the subject of "Irregularities of the Second Denture and their Mechanical Treatment," the Author has been advised to reproduce them in the present form.

5 GOWER STREET, BEDFORD SQUARE.

W. C.

THE CAUSES OF IRREGULARITY OF THE PERMANENT TEETH, AND THEIR MECHANICAL TREATMENT.

By JAMES ROBINSON, D.D.S.,

Senior Dentist to the Royal Free Hospital, &c., &c.

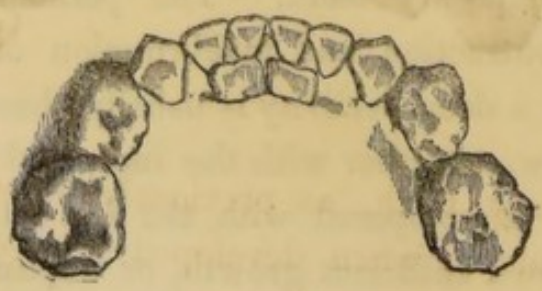
(ILLUSTRATED BY FELIX ROFFE).

IRREGULARITIES of arrangement can only be properly said to affect the second set of teeth, and are of two kinds, temporary and permanent. The first arises from too rapid an advancement of the permanent teeth before a corresponding absorption of the fangs of the temporary has taken place, so that the former, meeting with an obstruction in their progress through the gums, are forced into irregular and unnatural positions, and pierce the gums either before, behind, or on the sides of the temporary teeth. The permanent irregularity arises from a contraction and malformation of the maxillary bones, in which a deep declivity is usually observed in the arch of the upper jaw, together with the increased size of the permanent teeth, as compared with the first set, and their development before a sufficient growth, or expansion, has taken place in the maxillary bones, to permit of the teeth piercing

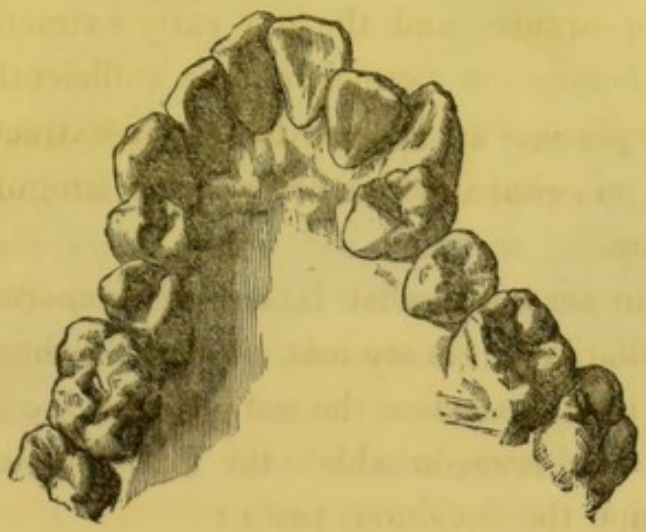
the gum in a regular manner. The cutting of the *dens sapientiæ* is a common cause of irregularity, and also the development of supernumerary teeth, either between the centrals in close contact with the laterals, or by the side of the canines. The deficiency of a permanent tooth which ultimately makes its appearance, and the too early extraction of temporary teeth before the permanent are sufficiently developed to take their places, as well as their non-extraction, are so many causes of what is termed permanent irregularity of the second denture.

To illustrate correctly what is *termed temporary* and permanent irregularity to the student, in which the second teeth have pierced the gum before the removal of the first, I shall give the following cases, in which the four permanent centrals appeared behind the deciduous teeth :

Again, we have in the inferior maxilla, illustrated by the annexed diagram, the development of the two permanent centrals behind the deciduous teeth :



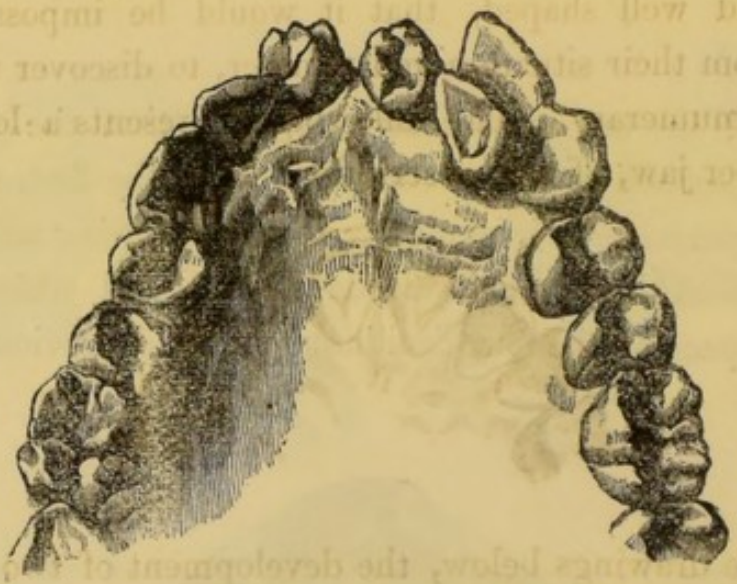
Permanent irregularity from contraction and malformation of the maxillary bones can be readily explained by the subjoined engraving :



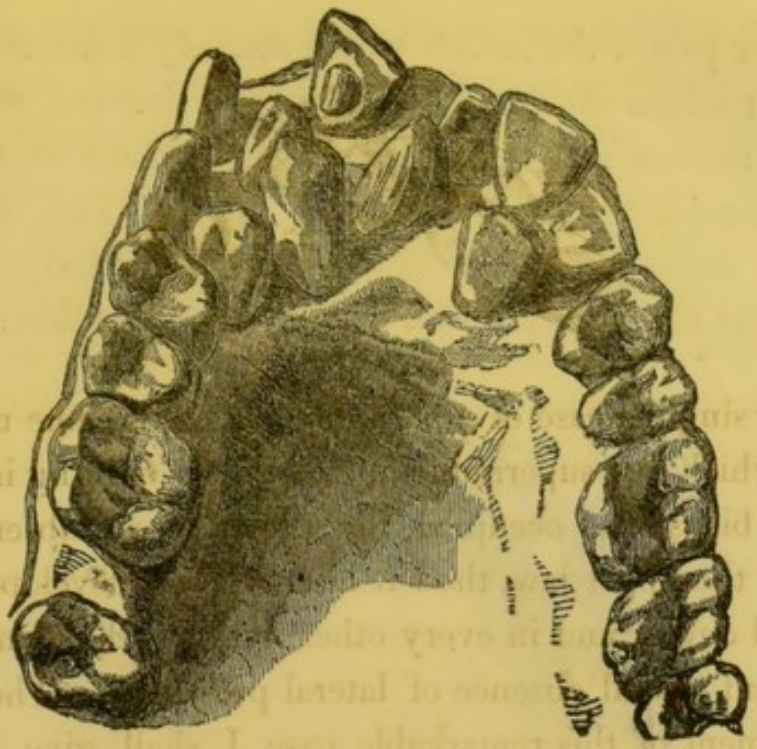
I stated in our preliminary remarks that the increased size of the second teeth, as compared with the first, may be a source of permanent irregularity. The following will exhibit to the student the two centrals developed, and which occupy the same space as the four deciduous ones did previously :

Supernumerary teeth, as previously observed, invariably produce irregularity when developed between the two permanent centrals :

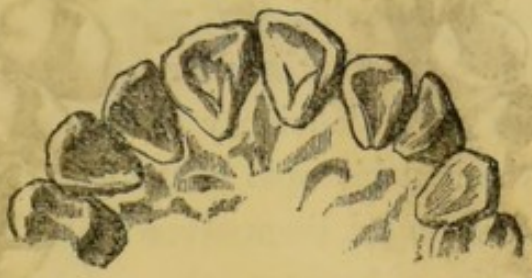
A very singular case of supernumerary teeth came under my care, in which two supernumerary teeth, resembling in appearance the bicuspids, occupied the space of an absent central incisor in the upper jaw, the left lateral being developed within the dental circle, and in every other respect the denture was perfect and a total absence of lateral pressure. (The history and treatment of this remarkable case I shall give on some future occasion.)



Another very extraordinary case of supernumerary teeth is reported by Mr Thomson in the 'Quarterly Journal of Dental Science,' in which the patient had attained the age of 45. At the anterior part of the mouth he had *eleven* teeth not including the first bicuspids, so that *five* were supernumerary ; in this remarkable development there were none of the deciduous teeth remaining in the jaw. The annexed drawing represents the case in question :



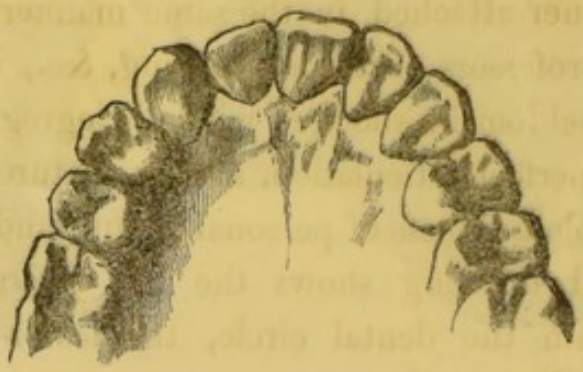
We have, again, occasionally supernumerary teeth perfectly formed and well shaped, that it would be impossible, excepting from their situation and number, to discover that they were supernumerary. The following represents a left lateral in the upper jaw, of this description:



And the drawings below, the development of two supernumerary *dens sapientiæ* in the upper jaw, and one in the lower.

Although the absence of a permanent tooth in an adult in

the anterior part of the mouth would scarcely come under the proper curriculum of irregularity of second denture, yet, as the deficiency renders the contour imperfect, perhaps we are justified in considering it under this head. The following engraving shows the deficiency of a right central; in every other respect the teeth are well developed and perfect:



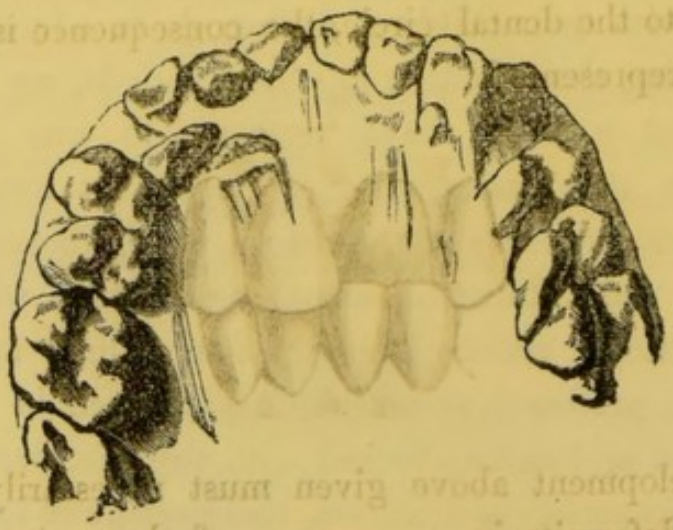
A very interesting case came under my care in a family I have attended for many years, and therefore had every opportunity of observing the development of the second dentition. In the mother the left lateral was deficient, and, with one exception, the same deficiency exists in all her children. In another family a somewhat similar freak of nature occurred. In the father there was a deficiency of the lateral incisor in the upper jaw, and the first bicuspid in the lower jaw, the canines in the upper had arranged themselves by the sides of the centrals, leaving a space between the canines and the first bicuspids. Of his two children, one sixteen years of age and the other fourteen, the deficiency of the laterals and bicuspids in the lower jaw existed in the former, whilst in the younger the laterals only were missing, the maxillars in both the preceding cases were well and beautifully developed; the same remarks will apply to the parent of these children.

The neglect of removal of the deciduous teeth at the proper period is also a common source of irregularity of the second denture, and one which parents too frequently neglect, by not regularly consulting and placing their children under the care

of a dentist; in fact, if parents would only adopt a systematic proceeding with their children, as they do in education, dress, &c., by visiting their dentists at stated periods, we should be seldom called upon to have recourse to our mechanical ingenuity in the arrangement of permanent teeth by mechanical contrivances; and the time is not far distant, we trust, when every well-conducted school and family will have its dental practitioner attached, in the same manner as they have medical men, professors of music, drawing, &c., in which case society would seldom be shocked with the egregious personal deformities, imperfect articulation, and premature loss of one of the most valuable adjuncts of personal beauty and of health.

The annexed drawing shows the left central and lateral developed within the dental circle, the lower *incisores* approximating in front:

The following drawing represents the mouth of a boy fourteen years of age, in which it will be seen that the deciduous centrals, lateral, and right canine remain, whilst on the left side the permanent, lateral, canine, and bicuspid are developed in a regular manner, and on the right side of the mouth the permanent, central, and lateral are developed close to the bicuspids:

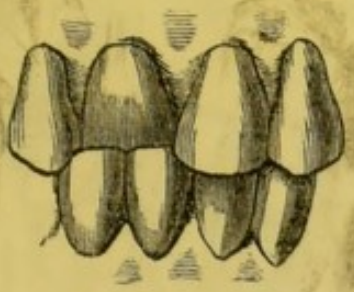


The too early extraction of the deciduous teeth, before the permanent are sufficiently developed to take their places, is also a cause of serious irregularity ; and in some of these cases an irremediable and permanent deformity is produced by the contraction of the alveolus. The growth and advancement of the *dens sapientiæ,* when an insufficiency of space exists for its development, is not only a source of great suffering, but frequently the immediate cause of irregularity by the pressure exerted towards the anterior part of the mouth, which until their development presented a regular denture.

The following represents the two centrals overlapping each other from this cause.

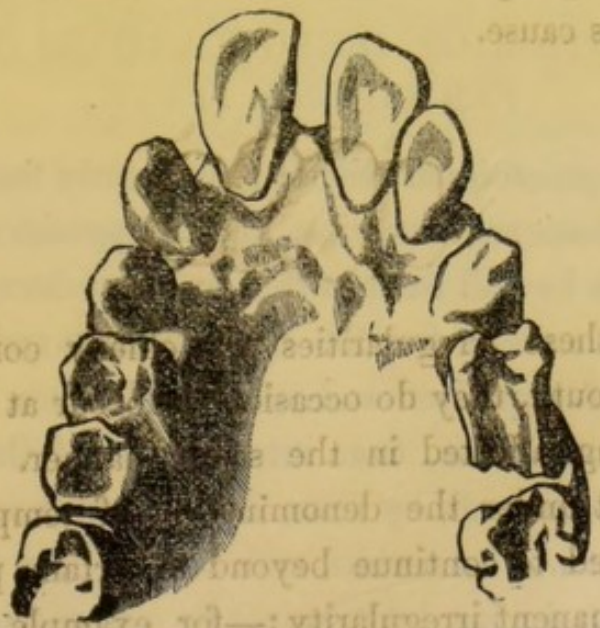
Although these irregularities are chiefly confined to the front of the mouth, they do occasionally occur at the sides, the bicuspids being affected in the same manner. Many cases coming at first under the denomination of temporary irregularity, if allowed to continue beyond a certain period, would become a permanent irregularity ;—for example, when a per-

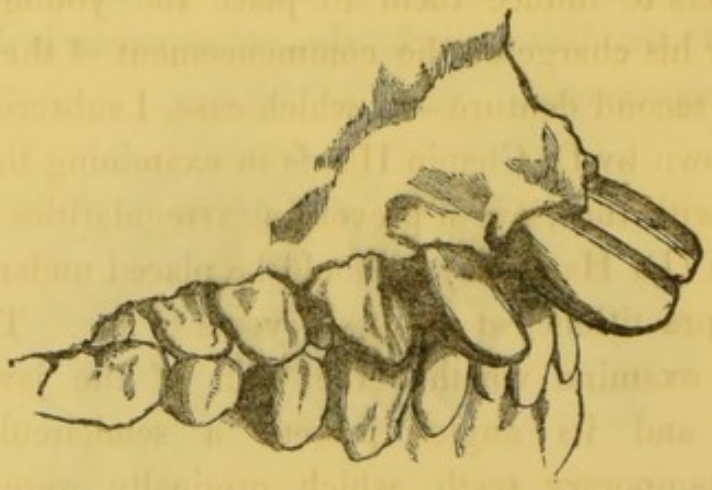
manent tooth pierces the gum, either too anteriorly or too posteriorly to the dental circle, the consequence is the irregularity here represented.



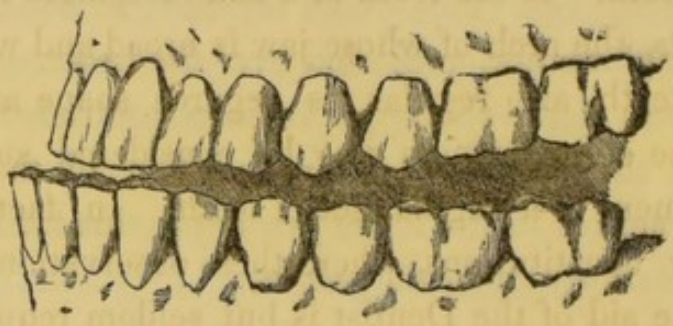
The development above given must necessarily become a permanent deformity in consequence of the approximation of the opposing teeth retaining the irregular tooth in that position, unless recourse be had to mechanical contrivances, which I shall explain to the student when I come to speak of the treatment of these cases.

The following case came under my care, in which the upper jaw from malformation projected over the lower, so that when the mouth was closed the upper incisors protruded to such an extent that they covered a large portion of the lower lip, whilst the incisors in the lower jaw approximated half an inch or more posteriorly upon the palate.





In this case it will be observed that the palatine arch is deep and contracted at the angles. Again, the lower jaw may protrude in a similar manner, so that in the approximation of the teeth the upper incisors close behind those in the lower jaw.



PREVENTION OF IRREGULARITIES OF THE PERMANENT TEETH.

The young practitioner will too frequently find in the exercise of his professional avocation, and in opposition to his better judgment, that he will be thwarted in his endeavours to carry out his scientific views for the development and the ulterior arrangement of a perfect and uniform denture, by the dictation, and, in some cases, even interference of the parents, or perhaps, worse than all, by some doting old nurse. In these cases argument will be useless, and he will have little prospect of being able to do his duty, unless he can successfully appeal to the more reasonable nature of the parents, and use his per-

suasive powers to induce them to place the young patients solely under his charge at the commencement of the development of the second denture—in which case, I subscribe to the rules laid down by Dr Chapin Harris in examining the mouths of children with the view of preventing irregularities.

The child (Dr Harris says) should be placed under the care of a dental practitioner at about six years of age. The operator should examine whether the arch of the jaw is well developed, and its angles present a semicircular form. The front temporary teeth, which originally were laterally in contact and crowded, being now somewhat separated from each other, so as to indicate a gradual expansion of the maxillary bone, and if the first permanent teeth have advanced, are well formed and of moderate size, without any prominence of the gum behind the temporary showing the advance of the permanent teeth. If the teeth of a child resemble those of one of his parents, the arch of whose jaw is broad and well defined, and whose teeth are regular as regards shape and physical character, the circumstances may be considered auspicious to the development of a regular set of teeth. In fact, in sound and healthy constitutions, where these observations are made correctly, the aid of the Dentist is but seldom required except to assist nature in removing impediments to her development. In the management of the dentition of the adult teeth much will depend on the experience and judgment of the practitioner. If he be properly informed upon the subject, and gives to it the necessary care and attention, the mouth will, in most instances, be furnished with a healthy, well arranged, and beautiful set of teeth.

Mr Fox, in recording his opinions upon this subject, says, "An opportunity thus presents itself for preventing irregularities of the second denture, but in this everything depends upon correct knowledge of the time when a tooth requires to be extracted, and also the particular tooth; for often more injury is occasioned by the removal of a tooth too early than

by leaving it too long, because a permanent tooth, which has too much room very long before it, will sometimes take a direction more difficult to alter than a slight irregularity occasioned by an obstruction of a short duration."

Other eminent dental practitioners object to the removal of the temporary teeth, amongst whom is Mr Bell, on the ground that it produces a contraction of the maxillary arch, and injury to the uniform deposition of the enamel through the premature destruction of the peduncular arrangement which, he says, exists between the first and second teeth.

Although the preceding observations are the opinions of some of our eminent writers upon the subject of second dentition, and perhaps, as a general rule, the observations may be held good at the commencement of the second dentition, providing the characteristic development of a well-defined maxillary arch and its expansions denoted by the separation of the central teeth of the temporary have been observed, in those cases, the removal of the deciduous teeth before the second are sufficiently advanced to take their places would be diametrically opposed to the laws of nature. But the case is totally different, if during the advancement of the second teeth they meet with such obstruction from the first that their future development and arrangement are interfered with—to leave such a condition of things to nature would be, at least, to presume that every human jaw was the exact size, shape, and form to admit a regular second denture ; and for this reason there are many cases neglected to be treated, in which the assistance of a dental practitioner was peremptorily demanded, and where the future appearances of the patients depended upon his experience, skill, and judgment.

The superintendence and assistance of the Dentist will generally be required when the permanent central teeth of the lower jaw pierce the gum, either *behind* or before the deciduous ones; in those cases it will be necessary to remove the temporary central teeth, and if there be not room

o admit the permanent in the space from their increased size, one or both of the laterals should be extracted, but this should be delayed as long as possible, to ascertain whether the gradual and natural expansion of the jaw may not provide sufficient room—for a too premature removal of the laterals takes away the natural support by the process of absorption from the permanent centrals, and thus causes an unsightly separation, which will require the aid of india-rubber rings or dental ligatures ultimately to rectify; should, however, such a condition of the teeth exist when the child is first seen by the Dentist, the mode of proceeding would be to permit the separation of these teeth to remain without interference until the permanent incisors in the upper jaw have considerably advanced, and by an occasional inspection of the mouth ascertain the advancement of the laterals in the lower jaw. If there be a prominency of gum at those points where these teeth should appear, a ligature of Dentist's twist should be gently tied around the necks of the two central teeth; but what is still preferable in these cases is the small vulcanized india-rubber ring—by gradually diminishing the size of the latter, the separated teeth may be easily brought together, and retained in this position until the advancement of the laterals — whilst the case is under treatment it will be necessary to change the ligatures employed every two or three days. The same observations will apply to the extraction and treatment by ligatures and rings of the upper centrals—in applying either the student must be cautious not to cause too much pressure on the posterior angles of the teeth, otherwise a greater difficulty will result, by forcing the lateral edges towards the palate, and the teeth will assume an angular position. To obviate the probability of this occurring, I generally make the pressure more forcibly on the posterior, or sometimes the anterior angles, by inserting under the ligature, at the point we are desirous of exerting the most pressure, an extra piece of india-rubber, or a small piece of hickory

wood. If the rubber rings be used it will be necessary to take the precaution to secure them near the cutting edge of the teeth, so as to prevent their slipping upwards, causing irritation in the gum; this can be prevented by a fine flat piece of soft gold wire secured to the ring in front of the tooth, and passed over the cutting edge and fastened to the ring at the back.

The central teeth in both jaws occasionally overlap each other, owing either to a too crowded state, the increased size of the second teeth, or from a want of expansion of the jaws to admit them uniformly. In these cases the removal of the two lateral temporary incisors on each side is necessary to give space for the permanent incisors to arrange themselves.

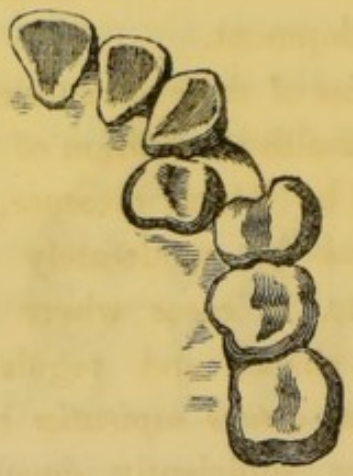
The lateral incisors in the upper jaw occasionally also overlap the centrals and sometimes pierce the gum posteriorly, and in the lower the same irregularity exists, but there the teeth being larger than the centrals in this jaw, their lateral edges are frequently turned, from want of space, either interiorly or externally—in all such cases the deciduous canines should be extracted. But if upon examination of the jaw it be ascertained that an expansion of the arch may be anticipated, it would be well to delay their removal for a time, as they tend to preserve the shape of the arch itself. Irregularities are frequently met with in the cuspidates in both jaws, these are the last teeth to make their appearance in the anterior part of the jaw, after the others have been developed and arranged. They generally lie imbedded high up in the alveola process, where they can readily be felt, by their causing a protuberance on the external side of the gum; the bicuspids also in these cases very commonly have arranged themselves close to the laterals, leaving no room for the canines. In these cases it is advisable not to wait until the canines are fully developed, and forced over the laterals. The student should at once remove the first bicuspids on either side or the first molar, if a predisposition to caries be discovered. To these

kinds of irregularities I would particularly direct the special attention of the pupil, as on the proper development and arrangement of the cuspidates the beauty and contour of the mouth materially depend : in fact these teeth, it may be said, are the key-stones of the dental arch : remove them, and we shall ultimately have an imperfect and distorted structure. If the canines have been developed directly over the laterals, their crowns leaning towards the centrals, it will be absolutely necessary to remove the laterals to permit the canines to arrange themselves by the sides of the centrals.

Nothing can justify the removal of the canines except in those cases where they have been developed very high up in the alveolus externally to or within the dental circle. The bicuspids also occasionally pierce the gum, and arrange themselves by the sides of the laterals, leaving no space for the canines; in these cases, as soon as developed, the first bicuspid should be extracted on each side. These teeth also, from want of room, are frequently found developed either inwards or outwards from the dental circle. To remedy these unsightly defects it is necessary to remove the deciduous molares if remaining in the jaws, and then, should there not be sufficient space for their arrangement, the first permanent molar teeth also, more especially if these teeth are decayed or their physical character denotes a disposition to caries, if not, the second bicuspids; by adopting either of these plans, sufficient space will be obtained for the first bicuspids to take up an uniform position.

The operator upon whom the responsibility of the arrangement of these organs devolves must carefully study to preserve an even and regular contour of the eight front teeth in both

jaws—at the same time he must bear in mind that it is better to sacrifice the second bicuspids than a healthy permanent molar—particularly if the bicuspid has pierced the gum in one of those malpositions which would prove an obstacle to a perfect articulation. The following exhibits the development of a bicuspid in the position I have been describing.



The first permanent molar teeth piercing the gum at an age before the deciduous teeth are removed, consequently meet with no obstruction to their development, and the same observation may be generally applied to the second molars. Therefore the services of the dentist are not, generally speaking, required. I feel quite convinced that to the cutting of the first permanent tooth may be attributed the deformities so frequently met with in the second denture, irrespective of malformations and contraction of the maxillary arches; and as a general rule in cases where there is a tendency to crowd towards the centre, and a moderately well-formed arch, I do not hesitate to remove them, particularly if their constitutional character denote a tendency to early caries, in order to prevent the ultimate consequences of crowding of the canines and laterals, and the overlapping of the centrals.

The third molar or *dentes sapientiæ* (wisdom teeth) make their appearance at almost any period after eighteen years of age. I have, however, a case in my collection where it appeared as early as fourteen, and another as late as ninety-two

years of age. In most instances their appearance is indicated by more or less suffering to the patient, and their development most frequently produces such an amount of pressure towards the anterior part of the jaw, that they cause not only an overlapping of the central teeth, but injurious and destructive lateral pressure on all the other teeth—therefore we frequently may consider that the denture generally is safe previously to their development.

During the progress of their advancement through the gum the uniformity and healthy condition of the remaining organs may become injured by lateral pressure, and this may occur although the arches be moderately well developed and expanded. Therefore, in cases where the other teeth are perfect in health, shape, and regularity, I recommend, immediately after the *dentes sapientiæ* have pierced the gum and the crowns are sufficiently developed, that the student should extract them either with the forceps or elevator, so as to avoid the possibility of mischief to more important organs. If, however, the first or second molar and bicuspids show symptoms of lateral caries, I should recommend the removal of the diseased organ, which will not only prevent pressure towards the centre, but afford space for the approaching tooth. Very frequently these wisdom teeth pierce the gum in a diseased state, producing intense suffering, and in such cases it is better at once to extract them, and then, by the use of india-rubber, the file, and stopping, endeavour to remedy any mischief in the more important teeth.

There are cases in which the *dentes sapientiæ*, from want of room, cannot pierce the gum, but being deeply seated in the alveolus and imbedded in the gum, produce intense suffering, and even danger of starvation in some instances. In such cases as these, and after the usual remedies of scarifying the gum, applying leeches, &c., have been employed, affording frequently at the best but temporary relief, the

student is justified in extracting the second molar, which he will invariably find will give the patient almost instantaneous and permanent relief, and also afford space for the wisdom tooth to come forward and escape from the gum. As I before observed, these teeth are frequently affected with disease, and either pierce the gum in that state, or in a few months show symptoms of caries; therefore, when a well-arranged and a constitutional and physical healthy denture exists in a young patient, and when a sufficient development of these teeth has taken place, it would be sound and judicious practice to at once extract them, for as a general rule these teeth must be viewed as being one of the exciting causes in such cases of lateral caries and disarrangement of the anterior teeth.

There are occasionally other malpositions of the teeth, but they occur so seldom that it is unnecessary to advert to them; they all require the strictest attention and skill on the part of the student to remedy them either operatively or mechanically, or both, and in the treatment of all he must keep forcibly in view that lesser evils must be preferred to greater, that nature must not only be assisted, but the laws of the animal economy must be consulted and obeyed, not subverted.

THE MECHANICAL TREATMENT OF THE IRREGULARITIES OF THE SECOND TEETH.

In the previous observations I have endeavoured to give the student the methods of general management and treatment to prevent irregularities of the second denture, presuming, of course, in all cases, the patient has been from the commencement under the care of a dentist. The young practitioner, however, will be frequently called upon to exercise his inventive powers and mechanical ingenuity in difficult and tedious cases, in which the arrangement and development of the second denture have been totally neglected, and the patient is placed under his professional care to rectify by mechanical means what

the simple extraction of a few teeth at an earlier period, generally speaking, would have prevented.

There is, perhaps, scarcely a branch in the practical part of our profession in which there exists such a diversity of opinion as on the kind of mechanical means, and the time when they should be employed, in the treatment of the irregularities of the second dentition; not only are there innumerable mechanical contrivances constantly made use of, which in many instances are erroneous in principle, and consequently do harm instead of good; but the time at which these mechanical means are to be employed with advantage is by no means a settled question amongst dental practitioners: the subject is one of the greatest importance, not only as regards the comfort and personal appearance of the patient, but of his possession of a free and perfect enunciation; it therefore claims the particular attention of the student. Numerous works and papers have been written on the proper treatment of irregularities of the teeth, and most of the authors, though differing from their brethren in everything else, lay down the principle that no alteration in the position of the teeth can be effected after the age of from fourteen to fifteen.

I was long since impressed with the opinion that irregularities of the second denture were susceptible of great improvement, if not of a complete cure, at a much later period, contrary to the dicta of old and popular authors. These opinions have been subsequently confirmed by myself and others in the successful treatment of many cases where the patients had attained from twenty-five to thirty years of age; but in all cases where the student is called upon to correct irregularities of the second teeth by mechanical means, and he has the patient immediately under his charge, it is better to commence his mechanical operations when the child is about eight or ten years of age; of course even this period is dependent in a great measure upon the development of the adjoining teeth—the canines in particular; if the case be left until the patient has

attained eighteen or twenty, there is a reluctance to appear in society with any kind of mechanical apparatus, which more or less for a time causes inconvenience, and certainly does not add to personal beauty.

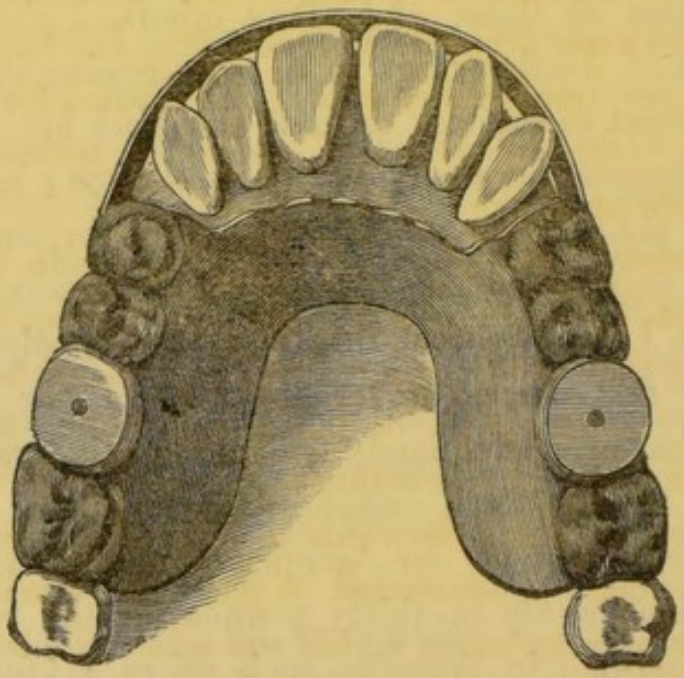
In cases where the upper front incisors project in some instances at an angle of forty-five degrees, and almost parallel with the lower lip, with a contracted arch, and the teeth closely arranged—little, if any, good result can be anticipated by the employment of mechanical treatment, for, although the teeth may be brought inwards and retained in that position, it will be generally found, that after the mechanical means have been discontinued for a time, the teeth will return to their original position. There are some cases of these projecting teeth in which it is advisable to try the results of mechanical treatment, particularly where there exists a well developed arch, and a separation of the teeth. For the treatment of such cases many mechanical contrivances are employed; one consists in striking up a plate, made to extend over and cap the whole of the teeth, from the bicuspids on each side to the second molars. Upon this plate, immediately over the first molar, is fitted and riveted a piece of dentine, of a sufficient height to prevent the usual approximation of the jaws to their former position. On the inside of the mouth the plate extends behind the teeth, being cut away from the back of the protruding organs, as otherwise it would counteract the effect of a bar that has to be soldered on from the second bicuspid, and extended to the corresponding tooth on the opposite side, which is intended to produce the necessary pressure when the mouth is closed. This bar has to be adjusted and made to fit tolerably tight in front of the projecting teeth, and extends a line or so from their cutting edge. As the teeth are pressed backwards, the piece will necessarily become loose; the bar must be readjusted to their altered position, or the intervening space be filled up, by drilling holes

opposite the irregular teeth, and fastening on to the bar pieces of india-rubber. These appliances answer for a time, but ultimately a new plate must be adjusted to such altered position of the teeth.

When the teeth have been pressed back into the required position, a third plate has to be adapted to retain them, inasmuch as I before observed there must be a predisposition for a natural organ to return to its normal and original place. In such cases as these, and many others, I should caution the student of dentistry not to be too sanguine in himself, or lead his patient to suppose cases of this kind are to be either cured or improved in a *magical* space of time; he should be cautious in not naming any limited period for the cure; and should be equally so as regards the remuneration for his trouble, for I am positive that there is scarcely a case of irregularity that comes under the care of our professional brethren, that ever adequately remunerates the practitioner for his time, trouble, and responsibility, unless, indeed, he adopted the system of our American brethren, and charged a fee of some twenty or thirty pounds for the regulation of a central incisor; in America such prices I know are paid, and even in this country similar charges have been made and endorsed. Fleecing your patients may answer for a time, and you may be a few hundred pounds in pocket, with the consolation that you lose *caste* as a respectable and *honest* professional man—and ultimately you will find others of equal or perhaps better professional standing than yourself, accept, and be content with one half the amount you have exacted. Do not be led away by the boasting of your fellow practitioners—nothing is more easy than to boast of cures, remarkable cases, high persons attended, and the remuneration for services *not* rendered; the like egregious follies belong to the lowest order of practitioners, who *ape* a professional position they have never worked for or attained, and who speak of public men as their patients they have never seen

excepting perhaps at some public place of amusement, or by chance have had occasion to correspond with in their public capacity. I believe "lie like a tooth-drawer" is an old French proverb, but it equally holds good at the present day.

Having somewhat diverged from the subject I was referring to as regards the mechanical contrivances hitherto employed for the regulation of the projecting central teeth: I give you the following drawing, which will explain my observations



upon this subject, and will now endeavour to describe the various improvements that have been introduced for the same purpose.

In cases were the central and lateral teeth had been developed within the dental circle, and it was necessary to exert posterior pressure to force them outwards, this was effected by fitting a piece of dentine to a model of the anterior part of the palate, and the internal surface of the upper teeth, extending behind the four incisors and canines, beyond which it was carried over the crowns of the bicuspids and first molar on each side, to prevent the usual approximation of the jaws. Immediately behind the irregular teeth was screwed into the dentine pieces of strong gold wire, which were turned and flattened, presenting a button-like surface to the posterior part of the

irregular teeth, with which they were brought into contact by the approximation of the two jaws. The bone palate was retained in its position either by gold clasps or ligatures of dentist's twist tied to either the bicuspids or molars. As the teeth were pressed outwards the gold wire-studs were lengthened until the cure was completed.

Very often in difficult cases two or more bone palates were required, and the compressed hickory substituted for the gold stud. These mechanical arrangements answered their purpose, but the cases occupied so much time, and the patient had to be seen so frequently, that I substituted for gold studs screws and hickory pegs, which exerted a continuous mechanical pressure upon the irregular teeth.

This consisted of a stout spiral spring made of *flat* wire, rather stouter than is generally used for making the ordinary spiral spring for supporting a full set of teeth, but not so closely coiled, and contained in its full length about five to eight turns of the wire upon a mandril the size of pin wire, at the end, the wire was bent outwards so as to form a hook, at the other end the coil was contracted. A pin was now made of a piece of sixteen carat wire, upon which was soldered a button of fine gold. The pin was then placed in the centre of the spring at the contracted end, and secured by a little pewter solder. The whole was now placed in a gold tube of nearly the same size as the spring. At the side near the bottom a small hole was drilled to receive the end of the coil, which had been bent and made to fit the hole in the tube, and thus secured the spring to the bottom of the tube. A hole of the same size as the tube was now drilled in the bone, which must be left much thicker opposite the irregular teeth, and the tube containing the spring is fastened either by means of a screw or pin inserted into the bone at the posterior part of the tube.

When placed in the mouth, the button should be pressed backwards in the tube, and then allowed to come forward in contact with the irregular teeth. The piece is fastened by

drilling holes on each side in the bone, either opposite the neck of the second bicuspid or first molar, and tying the piece to these teeth. Whilst being secured the patient should close the mouth firmly on the piece to keep the spring in its proper position. After the patient has worn the apparatus for a few days it should be removed, and the teeth in most instances will be found to have been pushed outwards. The spring no longer exerting pressure on the irregular teeth to bring them again into close contact, a small piece of bone, hickory, or india-rubber is placed at the bottom of the tube, so as to elongate the spring to the same position, and again exert pressure as at first.

After an interval of a few more days, upon removing the apparatus it will be found that in approximating the two jaws, the under will come in contact with the edges of the irregular teeth. Should now the front of the bone be too distant from the posterior part of the irregular teeth, so that no pressure can be exerted, a fresh impression of the mouth must be taken, and another piece of dentine and spring fitted to the present position of the teeth. Whilst this is being done the patient must be allowed to wear the old piece to prevent retrocession of the teeth, two pieces of bone will generally be found to effect a cure in a few weeks. The following drawings will illustrate the apparatus in action upon the teeth and the cure; also the socket and spring employed:

The hippopotamus bone or dentine will not be employed as a basis for regulating cases much longer, the introduction of the vulcanite will almost in every case supersede its use, par-

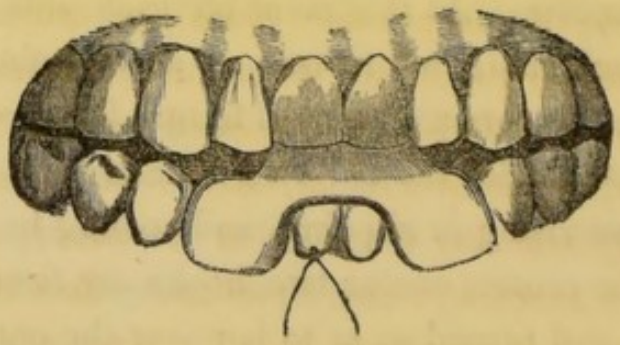
ticularly when its valuable qualities and easy adaptation have become more generally known. Its non-absorbent qualities when it is properly prepared renders it at once an excellent substitute for bone, not only as applicable for regulating cases, but also as a basis for mounting artificial teeth. It is as well here to remark that we are indebted to our transatlantic brethren for its introduction and application to dental purposes.

There is also the chæoplastic process more recently introduced by Dr Blandy (an American), which can be employed in regulating cases, and as a basis for mounting teeth with a certainty of success, if the impression be correct, particularly as regards a most perfect adaptation to the patient's mouth. For further details of both these recent introductions I must refer the student to the Dental Journals, which some three months since gave a full account of each process. Instead of employing a bar externally, as described in the former case, for the cure of the projecting centrals, a similar plate is fitted to the cast which extends over the labial surface of the second bicuspid and first molar. At this point on each side a piece of 16 carat wire is soldered, and turned so as to point to the front of the mouth; this forms a point of fixture for a weak flat spiral spring, a substitute for the bar before described. To prevent the spring from rising or slipping, and coming in contact with the gum in the centre, one or two hooks are fastened to a coil of the spring, and turned so as to lap over the cutting edges of the incisors. As the teeth are brought into position the spring is shortened until the requisite reduction has been made, after which the teeth are retained in position by a bar of gold instead of the spring.

Several other methods are used for bringing teeth forward when developed within the dental circle. A plate is adapted and made to extend over the bicuspids and molars, as in the former cases, with a bar in front, opposite the irregular teeth holes are drilled into the bar, to which the irregular teeth are

tied with the ordinary dentist's twist, or the use of the india-rubber ring. Either method involves a tedious process, as the patient is required to be seen almost daily for the purpose of removal and readjustment of the ligatures. Therefore I consider the use of the spiral spring as previously described and illustrated to be not only certain and safer, but more speedy in its action. Cases also frequently occur in which the two upper incisors are developed within the dental arch, so that the lower incisors close in front when the two jaws approximate.

If these cases are treated at an early period they are easily remedied by an inclined plane, in the following manner. A plate of gold is accurately fitted to the lower teeth on their external and internal surfaces and edges. To the upper margin of this plate another portion of the same metal is soldered at the required angle constituting an inclined plane, which is prolonged so far into the mouth that when the lower jaw is thrown forward the plate will still extend behind the irregular teeth, as represented in the following engraving :



In this mechanical arrangement every closure of the mouth must exert a steady pressure upon the irregular organs until the deformity is remedied by bringing them over the teeth of the lower jaw.

In those cases where the four front teeth in the upper jaw close behind those of the lower, the apparatus for correcting the deformity should be so constructed as to extend to the first molar tooth on each side, over the grinding surfaces of which it should be carried in the form of caps, which will not only

prevent the usual approximation of the lower jaw, but will act as a security against the displacement of the apparatus in closing the mouth. The piece of gold constituting the inclined plane being soldered to the plate as described in the above diagram.

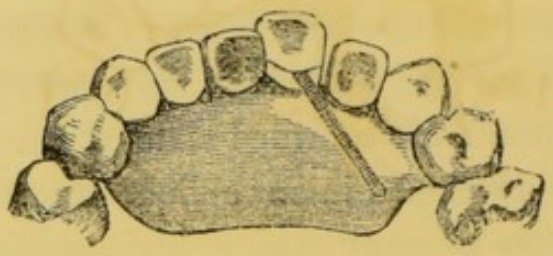
Cases, moreover, occasionally occur in which the irregularity is confined to one of the centrals in the upper jaw. This frequently arises from a too crowded state of the second denture, the tooth being developed in an oblique direction, so that the cutting edge forms in many cases a direct angle with the dental arch, producing a disagreeable and unsightly protrusion of the upper lip.

There are two methods by which a cure of this irregularity may be effected by mechanical means. The first is one I used for several years with success, but it was attended with considerable inconvenience to the patient, owing to the lodgment of food between the coils of the spring employed.

To the palate and gum is accurately fitted a gold plate, extending as far as the first bicuspid tooth on either side. To sustain the plate in this position, holes are drilled, and ligatures of dentist's twist, or the dried gut of the silk-worm, are passed through the holes and fastened to the neck of each bicuspid tooth, or the first molar, if the plate be extended so far. By firmly securing the plate as described, the requisite traction can be exerted in any direction. To obtain this continuous traction it is necessary to coil a piece of gold wire into the shape of a spiral spring, which is to be attached to some point near the posterior margin of the plate, the spring being put in a state of tension by a ligature fastened round the irregular tooth, and secured to the coils of the spring ; the other end of the spring is fastened at such a point of the margin of the plate as would give the desired traction by soldering into the plate a piece of gold wire the size of the spring, and turning it at right angles.

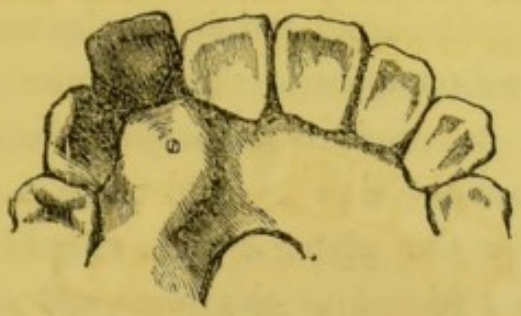
From time to time, as the tooth is drawn inwards, the spring

has to be shortened by removing a few coils of the spring; this shortening of the spring is continued until the irregular tooth is brought into its proper position. The annexed wood-cut shows the apparatus in operation.



As I before observed, although this kind of mechanical contrivance answered its purpose remarkably well in this case, it was attended with considerable inconvenience to the patient, by the liability of the displacement of the spring during mastication, and the collection of food in and about the spring formed another source of annoyance. It appeared necessary, therefore, to obviate these inconveniences by an improvement of a more simple character; and the mechanical apparatus I now employ I consider has in a great measure obviated the inconveniences referred to. The first apparatus employed was made of a piece of dentine accurately fitted to the palate, of the required length and thickness; it being left much thicker opposite the irregular tooth, but not so as to come in contact at the posterior part of the tooth. In this portion a hole of the requisite size is drilled half through the bone. Near the bottom of this hole from the top is drilled a small hole to admit of a piece of pin wire, the upper part of which is made into a screw. An extremely small and fine vulcanized india-rubber ring is now passed down the hole, and secured at the bottom by the pin. When the bone plate has been fastened to the other teeth in the ordinary way by ligatures, the ring is drawn out and passed over the irregular tooth, and as the tooth is drawn inwards a smaller ring is employed from time to time, until a

cure has been effected. The annexed engraving represents the apparatus in action.



After the tooth has been properly arranged it can be retained in its position by adapting a plate made either of dentine, vulcanite, chœoplasty, or gold. The material must be carried high up upon the posterior surface of the tooth, and two holes drilled, one on either side. The tooth must then be tied to the plate for a few weeks with dentist's twist, or a fine thread of gutta percha. Care must be taken that in the approximation of the lower incisors they do not strike against the newly-arranged tooth, for, should they do so, the lower incisor must be shortened with the file until the bite is cleared.

Some dental practitioners prefer a ligature of dentist's twist, which is passed alternately between the other central and lateral, so as to form the figure of eight. In either case some kind of astringent lotion should be used as a wash for the mouth, to facilitate the cure. The student should be careful in not acting too vigorously with his ligatures at first, or otherwise he may set up active inflammation in the socket of the tooth, which might ultimately terminate in the destruction of its vitality, or cause the patient considerable annoyance.

The two central teeth in the upper jaw sometimes present themselves in a transverse position, and the attempt to remedy this defect is invariably attended with very considerable difficulty requiring much patience and time. The teeth should be first moved, and compelled to approach each other either by an india-

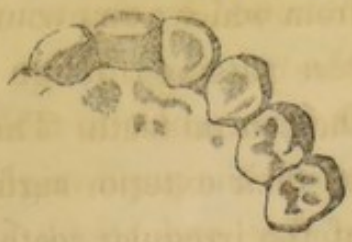
rubber ring or a ligature of dentist's twist. After a few days a plate of vulcanite, dentine, or gold, should be constructed to fit the palate and posterior surface of the teeth, and should extend over the second bicuspid and first molar teeth, in the form of caps on either side ; opposite the irregular teeth the plate must be cut away, to prevent its coming in contact with a point at the opposite side of the plate. If gold has been employed for the plate, a piece of gold 16 carat wire on either side is soldered to the plate and turned at right angles, to which a weak spiral spring is attached. At the end of this spring is a broad piece of elastic gold with a hole drilled to fasten the teeth by means of a ligature of twist, or an india-rubber ring. When the apparatus has been adapted and properly arranged, another plate is made which covers the whole, the two being firmly secured by screws to prevent food and other matters from accumulating on the spring.

If a plate of vulcanite or dentine be employed the bone can be left thicker at the required points, and holes drilled to contain the spring as previously described—the plate must be secured in the same manner as the preceding by ligatures to the bicuspids and molars. After the teeth have been brought into their required position, they can be retained by a thin plate of gold applied anteriorly, and so fastened to the necks of the canines with an india-rubber ring or ligature. It will be necessary to remove this plate and renew the ligatures every few days.

Some practitioners recommend a plate to be made extending to the bicuspid teeth and prolonged against the irregular teeth, from which point counter-pressure is exerted by means of a ligature passing through a hole in the plate opposite the division of the central teeth. This is tied to an elastic bar, which is placed on their exterior surface, extending if necessary on both sides of the irregular teeth. In less complicated cases of the same kind, bars of gold are so arranged as to exert pressure on the internal and external surfaces of the irregular teeth, the bars

being brought firmly together by a ligature passing between them, to prevent the internal bar from slipping. Small holes are drilled, and the bar secured by ligatures passed around the neck of each tooth.

To remedy those cases in which the central incisor has been developed transversely, attended occasionally with a projection of the laterals, a plate of gold is constructed which extends over the anterior part of the palate from the first molar on either side, over the crowns of which the gold is carried, and down to the neck, at the side on which the irregular teeth are situated. A tube of gold is there soldered for receiving a piece of flattened elastic wire, which is rounded at one end to fit the tube, into which it is inserted, and when placed in action it will act as an elastic lever. The wire should be carried opposite the irregular teeth, the end of the wire should be flattened so as to pass between the teeth at the side to be turned. At the same time, if necessary, the lateral can be brought inwards by either slightly bending the bar opposite the tooth, or fastening on the bar a piece of gum elastic, so as to exert pressure when it is in action upon the tooth. To prevent the approximation of the teeth in their former position, a piece of dentine is riveted on the gold cap at either side. As the tooth is turned, the bar is shortened from the socket end, so as to keep up a continuous leverage until a cure has been effected, and the desired direction obtained. The plate on the opposite side to the lever is secured to the necks of the teeth by ligatures. The wood-cuts below represent this kind of apparatus in action, and also the results.



The same mechanical contrivance is also applicable for a tooth developed within the dental circle, a ligature of gum elastic being passed around the crown of the tooth and fastened to the lever. Mons. Delabarre, who has devoted much time to the treatment of irregularities of the second denture, recommends, in the preceding cases, silk ligatures to be passed around the irregular teeth in such a manner as to exert a continuous pressure; and to prevent the usual approximation of the jaws, he employs a wire grating, which is fitted to the molars in the lower jaw. The objection to this mode of treating irregularities is the constant renewal of the ligatures, and the liability of injury to the teeth to which the ligatures are fastened.

The upper canines, when projecting, and a sufficient space exists between the lateral and bicuspid, can be readily brought backwards in a line with the adjoining teeth, by adapting a plate of gold, vulcanite, or chœoplasty to the inner surface of the incisors and bicuspids, in which holes are drilled to pass ligatures, which are fastened round the necks of the teeth; the irregular tooth being brought into position by the usual gum elastic ring, the ligatures and ring being occasionally renewed until the cure is accomplished. In those cases in which it has been found necessary to extract the first bicuspids to give space for the admission and arrangement of the canines, which frequently occurs, the tooth will remain in its former position for months after the removal of the bicuspids, without any perceptible alteration. To facilitate and assist in moving the tooth backwards towards the second bicuspids, this can be obtained by constructing a plate for the palate; any one of the materials before mentioned can be employed, extending it from molar to molar on each side. On the side to be acted upon, the pupil might solder a tube and insert a small spiral spring and attach it to the irregular tooth, shortening the spring as the tooth is brought backwards, or for the spring he may substitute the india-rubber ring. A few weeks only

will be necessary to show a very perceptible difference as regards the position of the irregular tooth, and the continuance of the apparatus for a few weeks more will generally be found to have effected a cure.

In simple cases, and where the overlapping is not great, the india-rubber ring can be fastened to the first molar, and thus dispense with the palate plate.

The bicuspids do not so frequently require the aid of mechanism to bring them into a regular position as the centrals, &c. One of these teeth, on either side, are more generally sacrificed in a crowded denture to make space for the canines, but there are cases in which the first molars have been obliged to be extracted at an early period, from their diseased condition, and it does occasionally occur a bicuspid might be developed either internally or externally to the dental arch, and yet sufficient room exist in the jaw for bringing it into a uniform position; this kind of irregularity can be treated very simply by adapting a plate either externally or internally, as the case may be, and forcing it out or in by either ligatures of twist or the india-rubber ring. Should, however, the first permanent molar remain, and be in a healthy condition, the irregular bicuspid had better be sacrificed; if, on the contrary, the molar be diseased, it should be removed, and the bicuspid mechanically treated.

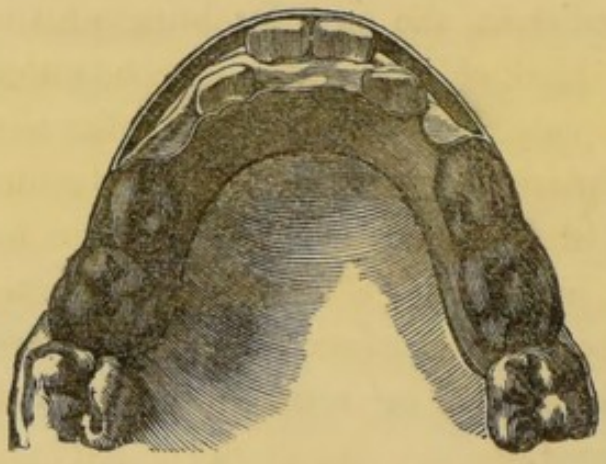
The molars seldom or ever require mechanical assistance for their arrangement, the first and second molars pierce the gum without any material inconvenience, and they are rarely irregular, and if so, it is generally in consequence of the advancement of the *dentes sapientiæ*—which in such cases should be removed immediately they are sufficiently developed.

The permanent teeth in the lower jaw are equally liable to similar irregularities as those in the upper, and the same operative and mechanical treatment will apply to both.

The most simple to rectify is when the two permanent centrals in the lower jaw are developed wide apart and the

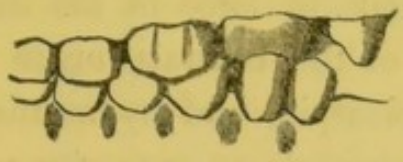
laterals advancing posteriorly—the temporary canines still remaining in the jaw leaves no space for their regular development ; in such cases the application of the india-rubber ring will be sufficient to bring the centrals in contact,—after which a ligature of silk will be all that is necessary to keep them in their position until the laterals are sufficiently advanced to support them. The following shows the india-rubber ring in action upon the two centrals.

In those cases in which the centrals have been developed externally to the dental circle in the lower jaw, and the corresponding teeth at the top close behind them, the following apparatus may be employed.



Instead of the plate a flat or circular spiral spring or india-rubber ring may be substituted ; if the former, each end of the spring should be fastened to a piece of gold wire, bent at right angles, and soldered to the outside of the plate on each side, opposite the first molar, and as the teeth are forced inwards the spring is reduced in length, in the same manner as that employed for the reduction of projecting centrals; the shortening of the spring is continued until the irregular teeth are brought behind those in the upper jaw, when the mouth is closed. In cases where the central tooth in the upper jaw approximates behind a central in the lower jaw, and by its

malposition forces the lower out of the dental circle, a compound irregularity, it may be said, is produced, as shown in the accompanying figure.



To meet this case an inclined plane is employed, which will operate for the reduction of both teeth, at the same time a plate is made which should cover two or three of the incisors, and extended to the first molar on each side, capping each of the teeth. The plate is made to line the external and internal surfaces of the teeth down to the margin of the gum.

Before making the metallic cast from the plaster model a piece of wax is placed on the latter, opposite the irregular tooth, back and front, and by this means, when the model is cast in metal upon which the plate is to be ultimately formed, it will leave a vacancy opposite the irregular tooth; upon the edge of this plate the inclined plane is soldered so as to operate upon the upper tooth when in action. Before its insertion two holes are drilled through the inside portion of the plate, and a piece of stout twist passed through, so as to form a loop, which embraces the irregular lower incisor and secures it to the plate. A ring of vulcanised india-rubber will be generally found preferable, by merely substituting a screw pin for the holes on the inside. By this mechanical contrivance we are forcing the centre out, at the same time bringing the lower tooth within the circle, and the approximation of the upper in a short period will be over the lower tooth, when the cure will have been effected. Similar mechanical treatment can be extended to three or four teeth. The following shows a section and front view of the apparatus in operation.

The canines in the lower jaw, in very contracted cases, frequently protrude in front of the laterals, forcing them inwards; in these cases I either remove the laterals, and by the aid of an inner plate and ligatures force in the canines, and arrange them by the side of the centrals, or, in more simple cases, I remove the first bicuspid, and by means of the india-rubber ring draw them backwards, so as to give room for the laterals, which can be also mechanically treated if necessary.

It is impossible to give every variety of malposition that occurs in practice, or to describe the mechanical means by which reduction is to be effected in every case. I have, therefore, selected those cases that are most frequent, leaving it to the ingenuity and inventive genius of the pupil to vary his arrangements according to the circumstances of each individual case, remarking, in conclusion, that there are but few cases entirely unmanageable by mechanical means, provided time and an adequate remuneration be allowed for the treatment to the dental practitioner.

It must, however, be remembered that the length of time in the treatment of dental irregularities will depend, not only upon the extent of the deformity and the difficulty of the case, but also on the period that has been suffered to elapse before the treatment was commenced.

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