

blades are found met in the interspace. Before applying the force it is well always to have the points thrust as deeply as possible below the free edge of the gum. When such precaution is not taken, and the sharp points do not reach the interspace, they are almost certain to produce fracture. This instrument is, of course, not applicable where caries has proceeded to such an extent as to have separated the roots. Figs. 289 and 290 are the cow-horn forceps in pairs: the shape of the handles, and the curve for the rest of the little finger, add much to convenience of employment. Together, they make a very efficient set for lower molars.

FIG. 291.—LOWER MOLAR, EITHER SIDE (WOLVERTON'S).

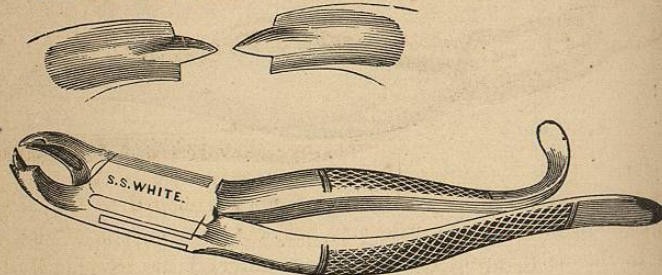


Fig. 291 is a forceps designed for the inferior molars; it is known as Wolverson's instrument. It is preferred by many as combining the advantages of the Maynard and Harris.

FIG. 292.—LOWER MOLAR (HUTCHINSON'S).

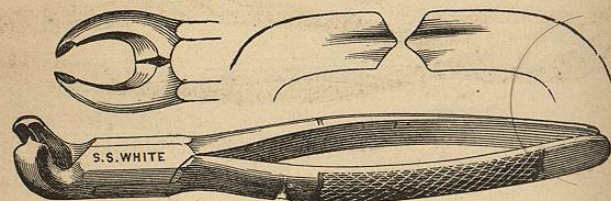


Fig. 292 is a lower molar forceps. In a deep mouth, or where the tooth to be extracted is much concealed by one anterior to it, the curve of the blade is found to render great service. Admirers of the instrument commend it particularly for the shape of the fenestra.

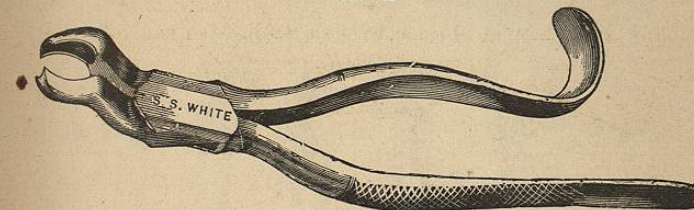
A forceps for the extraction of lower molars constructed with a double-clawed face, the device of Dr. Booth, of Iowa, highly commends itself; a second pair, clawed on the palatal blade and cow-horned for the buccal interspace, applies to upper molars.

Fig. 293 designates forceps for dentes sapientiae of upper jaw, either side. As a rule, these teeth are found to have but a single root. This, in shape, is conoidal, with a curve which directs the apex toward the tuberosity of the bone. To remove them with least effort and risk, this curve of the

root is always to be considered; requiring the extraction to be in the line of its axis. To accomplish such a requirement, the crown of the tooth, after being grasped in the beak of the instrument, is to be directed backward. This rolls the organ wheel-fashion, as it were, from its socket. The forceps Fig. 292 is adapted for the removal of these teeth when they are small.

It happens, however, that in many instances the superior wisdom-teeth have three, or even more, bifurcating fangs: when this is the case, it is

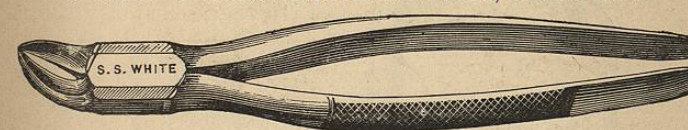
FIG. 293.—UPPER DENTES SAPIENTIAE, FOR EITHER SIDE, WITH OR WITHOUT HOOK.



quickly to be recognized by an undue resistance offered to the employed force, and its direction. No rule may here be given outside of that which applies to the neighboring molars: the operator, if the irregularity be peculiar, feels his way by testing for the aspect of least resistance.

Fig. 294 represents a forceps designed by the late Professor Physick for the extraction of wisdom-teeth. The instrument is seen to represent a double

FIG. 294.—PHYSICK'S DENTES SAPIENTIAE, EITHER SIDE.



inclined plane, and, in consideration of the necessity for throwing these teeth backward, is designed to be applied between the tooth to be extracted and the one directly anterior to it. The closure of the handle is expected to throw the organ from its socket.

In the case of wisdom-teeth possessed of several roots, as referred to in a preceding paragraph, these roots, instead of being inclined in a common axis, being spread irregularly in various directions, it is plain that the instrument would not apply, and that, more than this, it is entirely incapable of being used in the direction. Another difficulty in the way of its use lies in injury apt to be inflicted on the anterior, or fulcrum tooth; this not infrequently having the enamel so crushed and broken as to expose the more susceptible dentine, and thus lead to caries. Still another objection lies in the contusion inflicted on the periodontium, this membrane being occasionally so injured as to result in severe inflammation.

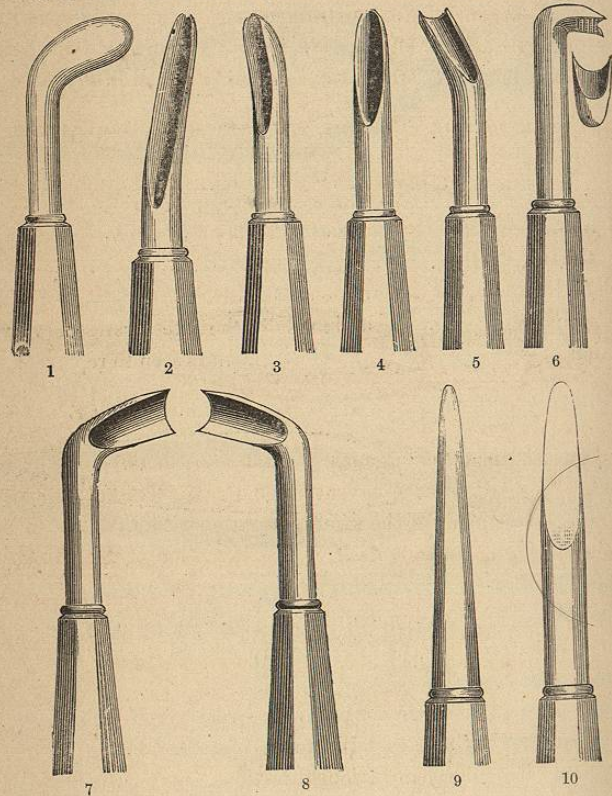
The ordinary key instrument, when lightly and delicately made, answers a

very admirable purpose with this class of teeth. The roots being generally quite short, there is little of the common danger of alveolar fracture, and being but lightly set in their sockets, and easily yielding, the application of but very trifling force is required.

In using the key, the fulcrum is to be placed on the inner face and well back upon the tooth, the claw being upon the opposite face and well in front; this application allows of the proper direction of the force, and admits of the easy and natural removal of the organ.

Still another instrument employed in the extraction of these teeth is the elevator.

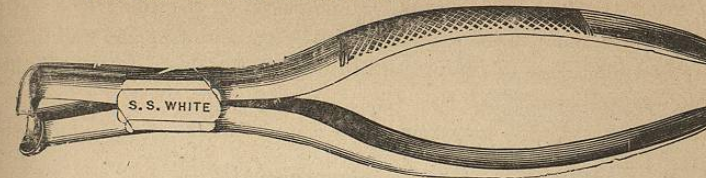
FIG. 295.—ELEVATORS USED IN EXTRACTING TEETH.



To apply this means, the grooved face is laid against the antero-lateral aspect of the tooth, and the blade being carried down to the process, the hand is depressed so that the free edge alone impinges; the tooth is then pushed outward and backward from its socket. When wisdom-teeth are but ordinarily adherent, this is a reliable instrument for their removal; care, however, is necessary that it shall not slip from the tooth and inflict injury on the neighboring soft parts. Elevator No. 5 (Fig. 295) is the one most commonly employed.

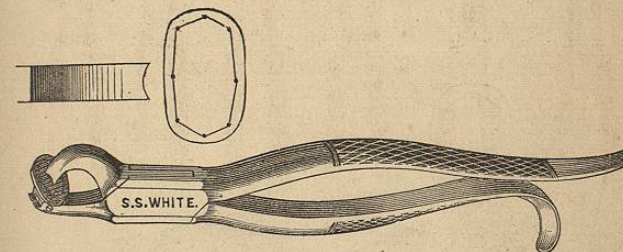
Another instrument yet is Fig. 296: long of shank, and with blades curved at right angles with the handle, it answers an excellent purpose in the case of the inferior wisdom-teeth.

FIG. 296.—LOWER DENTES SAPIENTIAE, EITHER SIDE.



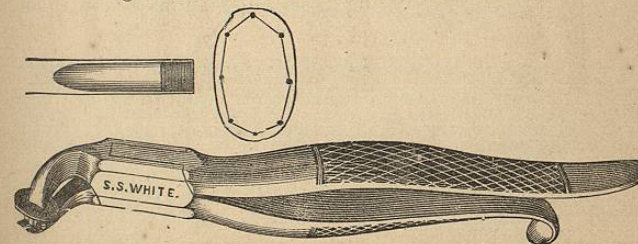
FULCRUM FORCEPS.—These instruments, of which seven constitute a set, act on the principle of the key and elevator. A glance at their construction will exhibit the mode of application. That when skilfully used they are

FIG. 297.—UPPER INCISORS, CUSPIDS, AND BICUSPIDS, FOR EITHER SIDE OF THE MOUTH.



capable of meeting many emergencies, is not to be doubted. The forceps of this class here figured are the invention of Dr. E. M. Jones, of Richmond, Va. Another instrument of the same general character, which, in respect to the fulcrum, highly commends itself, is the invention of Dr. H. H. Perrine, of Maryland.

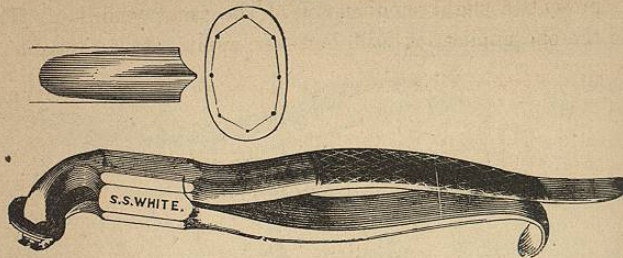
FIG. 298.—LOWER INCISORS, CUSPIDS, AND BICUSPIDS. (Two pairs, one for the right and one for the left side of the mouth.)



All forceps of this class are modifications of the key of Garengot and of the elevator, and, in the deserved commendation they receive, serve to exhibit the virtue of the instruments they represent. The key, so long

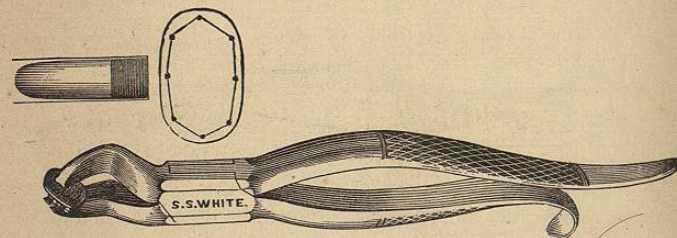
and so almost completely abandoned, should not be without its place in an operating-case. With a variety of claws to fulfil the diversified indications, and with skill and care in the adjustment of the fulcrum, it is a most valuable

FIG. 299.—LOWER MOLAR. (Two pairs, one for the right and one for the left side of the mouth.)



addition. An advantage possessed, however, by the fulcrum forceps, is easier adaptation of the claw, together with a more direct oversight during

FIG. 300.—UPPER MOLAR. (Two pairs, one for the right and one for the left side of the mouth.)



the act of extraction. In applying either this forceps or the key, it is necessary to force the blade as deeply as possible along the root of the tooth, and so to arrange the pad that the pressure upon the soft parts shall be as little injurious as possible. Bruising and crushing the gums are the objections.

Concerning the fulcrum forceps, much commendation has been received,—gentlemen of experience considering them an essential to a satisfactory success in this direction of practice.

The latest device in the way of forceps is an invention by Dr. Hurd. Five instruments constitute the full requirements of an outfit. The introduction of a spring which drops the tooth is a valuable addition. The set cannot be overhighly commended.

Extraction of Fractured Teeth and Roots of Teeth.—It not infrequently happens that, in attempts to extract teeth, fractures result; and such fractures must, of course, present the greatest variety of aspect, and require various resources for the removal of the parts left.

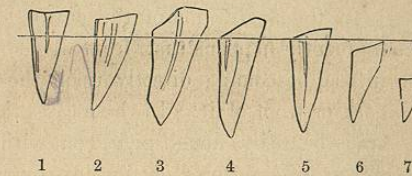
Fractures of the first, second, and third classes present the same common features, and are to claim a first attention. Fig. 301 represents the alveolar

line, and the various relations held to this line, or free border, by fractured teeth or roots.

A fractured tooth, as represented by No. 1 in Fig. 301, is placed in no worse condition for easy extraction than before the occurrence of the accident. The same forceps and the same manner of its application apply.

No. 2 represents a slight modification of the same condition. The one forceps and the one application still, however, apply. It is advisable, if the

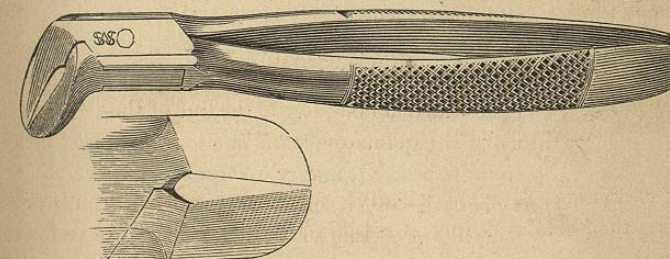
FIG. 301.—RELATION OF FRACTURE ROOTS TO ALVEOLAR LINE.



tooth be at all brittle, to work the blades of the instrument well beneath the alveolus. This affords greater support and yields increased security.

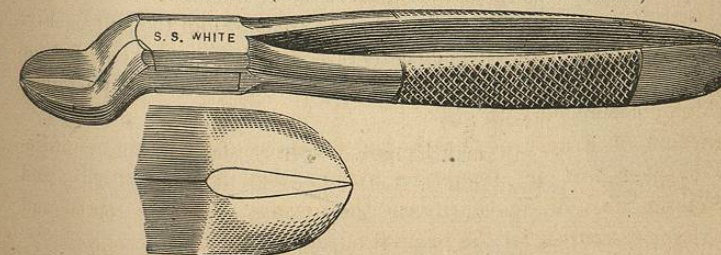
No. 3 represents a bicuspid tooth with the crown half broken away. In such a case, if the remaining portion be not at all brittle, and if the process

FIG. 302.—INFERIOR COMBINED ROOT INCISING, SEPARATING AND ELEVATING FORCEPS. (DR. T. C. STELLWAGEN'S PATTERN.)



be soft and spongy, the forceps, as described, having well-sharpened blades, may again be tried, working them well beneath the festoon, and securing all

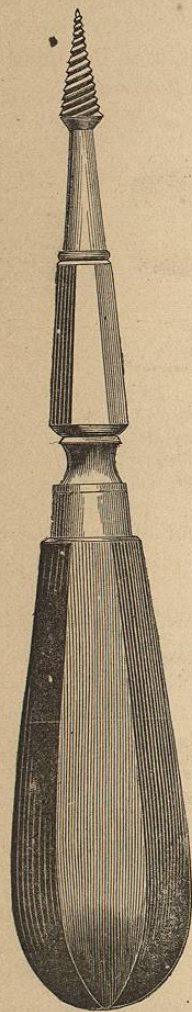
FIG. 303.—SUPERIOR COMBINED ROOT INCISING, SEPARATING, AND ELEVATING FORCEPS. (DR. T. C. STELLWAGEN'S PATTERN.)



the hold possible on the root. If fracture again occur, which is very likely, simulating Nos. 4 and 5, the cutting forceps may have to be employed.

To use a cutting forceps, make, with a scalpel or other blade, an incision on either side of the root through the soft parts directly down to the process; these cuts must correspond with the exact centre line of the root. The forceps is now to be applied scissors-fashion, cutting directly through the bone. Being thus brought in contact with the root, and grasping it perhaps full half its length, the removal is a simple matter.

FIG. 304.—THE SCREW.



requisition. If preferred, however, the screw can be bored into the tooth until fracture is produced, and this will sometimes enable us quite easily to

Some operators prefer to precede the cutting forceps with trial of the elevator, and this instrument, in many cases, certainly effects the end very well.

In the application of the cutting forceps, it not infrequently happens that, from want of care, the blades, instead of coming directly upon the root, slip to the back or front of it. In these cases the fang may generally be easily enough picked out with the ordinary root forceps. A form of cutting instrument used by many, consisting of a double curved blade, avoids this accident, but it is to be objected to on account of the wound it makes.

Roots represented in Fig. 301, Nos. 4, 5, 6, and 7, are removed on a common principle. The first attempt is to be made with the elevator: laying the groove of this instrument closely against the root, its sharpened knife-like edge is insinuated between the fang and process, being worked down as far as possible. The handle is now carried obliquely to the line of the root, and thus, using a careful oscillatory motion, the piece is forced from its bed. It is very well known, however, that with a dense, heavy alveolar process, this instrument cannot be made to operate so happily, it being next to impossible to insinuate it between the bone and tooth. Under these circumstances, another instrument, the screw (Fig. 304), may be brought into requisition.

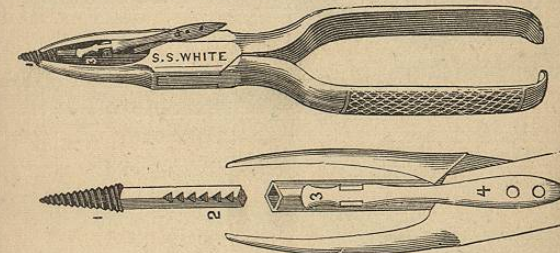
The screw is designed to operate upon the tooth-root as the spiral operates upon the cork. Well tempered, and very sharp, it is introduced into the pulp-canal, and quietly and gently turned until it has taken a firm hold. A simple direct movement, and the root is brought away.

It may happen, however, that no hold sufficiently fixed for the extraction is to be obtained with the instrument. When this is the case, it may be laid aside, and the always reliable cutting forceps brought into

pick away the splinters; particularly will this be found the case when the line of the fracture divides the root in its length. Forceps known as Dubs's and Hullihen's represent the combination of the screw with the forceps. In the Hullihen instrument the screw is designed more especially to afford support, preventing the blades from crushing the root. In the Dubs's forceps the spring trigger corresponds with the two forces, affording thus not only support, but allowing the extracting force to be divided between the two means.

In using these instruments (their employment being confined to the single-root teeth), the shank holding the screw is to be confined in the grasp of the blades, and, thus controlled, it is to be screwed into the pulp-cavity: a proper hold secured, the blades are to be expanded, and thrust, as in the ordinary application, about the root, which is then extracted *secundum artem*.

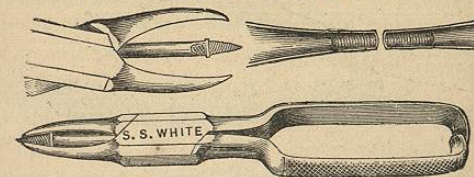
FIG. 305.—DUBS'S SCREW FORCEPS.



1, conical screw with square ratchet shaft; 2, beaks of forceps, grooved inside; 3, socket with square hole to receive shaft; 4, spring trigger by which the screw can be detached at pleasure at any given point.

In many instances, however, the immediate employment of the screw is found impracticable, owing to the shape of the canal or the density of the

FIG. 306.—HULLIHEN'S SCREW FORCEPS.



dentine: in these cases the fang may be reamed out of its bed, which manipulation is accomplished without effort by the use of drill and engine.

Roots of the molar and wisdom-teeth, superior and inferior, are removed on a common principle. In the use of the elevator, a very happy result is not infrequently secured by applying the blade to the inner face of the root, carrying the shank across the mouth, and making a fulcrum of some convenient opposite tooth.

Where the roots of a molar tooth are so firmly fixed as to seem incapable of removal with the application of an ordinary amount of force, it is better to

divide them. This is easily done with the cutting forceps, and after the separation each root may be picked out singly, and generally with comparative ease.

Forceps of delicate beak are much in favor for the extraction of roots of teeth: indeed, it is a common practice to exhaust their capability before resorting to other means. Fig. 307 to 312 exhibit different forms of such

FIG. 307.—UPPER FRONT ROOT, STRAIGHT.

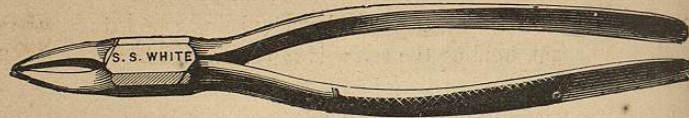


FIG. 308.—UPPER AND LOWER ROOT, HALF CURVED.

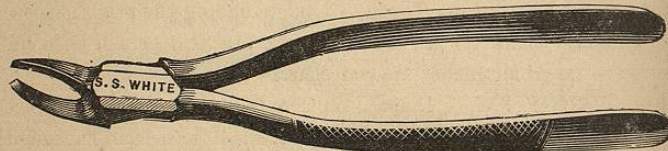


FIG. 309.—LOWER ROOT, FULL CURVED.

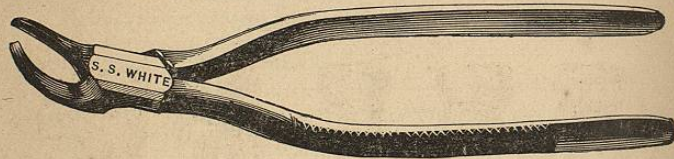


FIG. 310.—BAYONET-SHAPE ROOT.

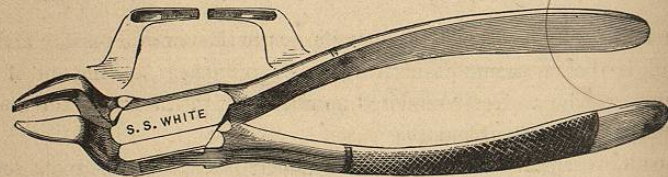
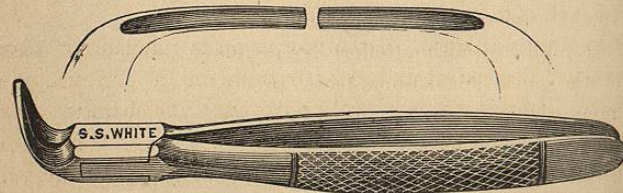


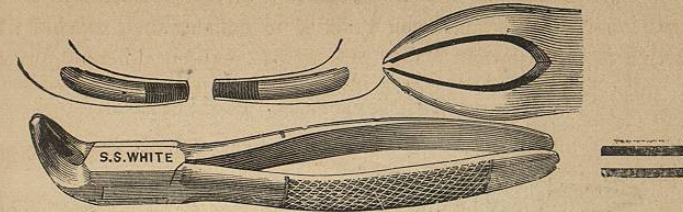
FIG. 311.—HALF CURVED, LONG BEAK, ALVEOLUS.



forceps. Figs. 307 and 308 are to have the preference,—these being quite capable of performing the work of the others.

Mention is to be made of what is denominated the sub-alveolar, thin-

FIG. 312.—LOWER MOLAR ROOT (WITH CROWNS).



pointed forceps used in the extraction of roots. Where an alveolus is of loose structure, this instrument accomplishes its purpose admirably.

Deformed or Anomalous Teeth.—Understanding the principles on which teeth of ordinary character are extracted, the practitioner will need but little instruction so far as anomalies are concerned.

In Fig. 313, Nos. 1, 2, 3, 4, and 5 represents five anomalies, and these may very well stand for the class. In removing such teeth from the mouth, the matter of greatest importance is to recognize them. Now, while this cannot in all cases be done so as to appreciate exactly the condition of the roots,

FIG. 313.—ANOMALIES.



yet we may always see that some impediment to the removal exists; and this, after all, is the most important matter, as it influences the amount of force exhibited, which, too freely rendered, might result in fracture of the bone, or still greater injury to surrounding parts.

A tooth, as represented in No. 1, will generally yield in its roots so as to pass the intermediate piece of process. If it do not yield, then this wedge of bone will fracture and be brought away. Such fracture, however, results in no harm, and is to be deemed of little consequence.

No. 2, by the great curve in the root, is made incapable of passage, unless, after being loosened, it is carried outward in the direction of the axis of the curve. In this way it is easily removed. The character of the curve is recognized by the resistance offered when the tooth is inclined in certain positions, and by the absence of such resistance when it is directed in the proper line. The attempt to extract such a tooth by simple force would result either in fracture at the curve, in lifting out a neighboring tooth, or in fracture, more or less extensive, of the alveolar process.

No. 3 represents exostosis of a root. A fang so enlarged will not pass through the process unless the bone be very open in its structure. Such a tooth may be made quite loose, but, while it moves freely enough in its socket, it is felt to be held by something abnormal. To free such a root it is only necessary to use the cutting forceps, or, what is preferable, to take the ordinary small surgical chisel or engine-drill and cut away sufficient of the process to admit of the passage. This little operation is easy of accomplishment, and must prove adequate to the end.

No. 4 represents a form of twin teeth. The two must be removed together, which may be difficult or the reverse according to the character of the process. It is well, before making the effort to extract, to free the process from the teeth as thoroughly as possible: this is done by a sharp and flat elevator or by use of the chisel or drill.

No. 5 represents a second form of twin growth, the result of original germ union. If the offshooting bulb be situated within and covered by the process, it is to be treated as if it were a case of exostosis of the fang. These germ unions are exceedingly rare, and one might not be met with in a lifetime.

Among other curious examples of anomalous teeth to be seen in the Museum of the Philadelphia Dental College is one exhibited by Fig. 314. A

FIG. 314.

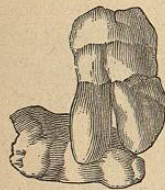


FIG. 315.



practical feature in the anomaly concerns the *extraction*. This was effected with less trouble than might be supposed. In the attempt to remove the one standing upright, it soon appeared that there was something wrong, and the effort to extract was suspended, and a thorough examination made. In the second attempt, the force was very cautiously applied, in order to find what direction the tooth would take. It yielded most to an inward motion, and by a continued effort in that direction the removal was secured with only a slight fracture of the lingual border of the alveolus.

The second specimen (Fig. 315) is a union of three of the anterior teeth.

An anomaly is, of course, a condition outside of rule. A practitioner familiar with normal tooth anatomy will find little difficulty in dealing with the exceptions; the plan is to feel one's way to a result.

CHAPTER XXVIII.

GENERAL REMARKS ON EXTRACTION.

THE relationship of the teeth with the jaws is through the medium of a cellular process known as the alveolar. Each tooth is lodged in an alveolus or alveoli corresponding to the number and character of its roots: thus, the central and lateral incisors, the cuspidati, and the bicuspidati, having each but one root, have each but one alveolus.*

The molar teeth of the superior jaw have three roots, consequently a three-fold relation to the alveolar process.

The molar teeth of the inferior jaw have two roots and two alveoli.

The wisdom-teeth, as a rule, have a single short curved and stumpy root, consequently a similar alveolus.

The association of the teeth with their alveoli is through the medium of a fibro-cellular tissue; this membrane is coarse and resisting about the free edge of the bone, loose and cellular as it gets deeper. A properly-shaped lancet may be made to excise the coarse fibres; consequently, the operation of extraction is always to be preceded by that of thorough lancing. In this way much of the strength of the relationship of a tooth with its socket is to be overcome.

A tooth extracts with difficulty or easily as influenced by the character of its periodontium, and the loose or firm structure of its alveolus.

A limited fracture of the alveolar process is not generally found to be a matter of much consequence. If an extensive fracture should associate with an extraction, the tooth and bone may be laid carefully back in place, and treated as any common fracture; or, if this do not seem desirable, the fractured piece may be dissected from the soft parts, and the wound treated on general principles. Sometimes, when too much force is injudiciously used, a fracture may occur, including several teeth. In such accidents the circumstances of each particular case are to direct the practitioner; they are ugly and generally unnecessary troubles, and not apt to occur where proper care is exercised. Meeting with such an accident, effort is to be made to reunite the parts; failing in this, there is no resource but to dissect away the piece, or otherwise wait on nature for a process of expulsion; dissecting it away is the preferable plan.

Laceration of the gum is an accident frequently associated with the careless extraction of teeth. Such laceration may be trifling or it may be serious;

* The student will here turn to the chapter on the "Surgical Anatomy of the Mouth and Face" and make himself acquainted with the nature and meaning of the alveolar process.