a lisp. His taste is impaired, but still enables him to distinguish different articles and their respective qualities, as grouse from partridge, bitters from sweets, good beer from bad beer, etc. He has remarked that the seat of sensation lies somewhere in the throat, since there is no recognition of taste previous to the act of swallowing; and, in order to ascertain the truth on this point more precisely, the following experiments were made:

"1. A strong solution of salt was applied by means of a camel's-hair brush to the fauces, palate, floor of the mouth, lips, and inner surface of the cheek, with the result of something being felt in the mouth, but no idea formed as to its nature.

"2. About a quarter of a teaspoonful of finely-powdered sugar was placed on the floor of the mouth, and, having been allowed to remain there a few seconds, was then brought thoroughly into contact with every part of the cavity without any recognition of its nature; but when a little water was added and swallowed, the taste was immediately perceived.

"3. The same experiment was repeated with another substance (salt), and with the same result."

It has long been known that large portions of the tongue may be removed without destroying or materially impairing the power of articulation; but I am not aware of any case on record in which it has remained so perfect after complete removal of the organ.* Of the facts above mentioned, the one that

* Complete extirpation of the tongue has now been practised with success by a number of surgeons, among them by Fiddes, Heath, Nunneley, Annandale, Rizzoli, and Sedillot.

Excision of Tongue.—"The removal of the entire tongue is altogether a modern surgical operation. Though, for time out of mind, greater or less portions of the tongue have been removed by cutting instruments, escharotics, actual cautery, or ligatures, the importance of the organ in deglutition and articulation, the difficulty of reaching its base, and especially the fear of not being able to arrest the hemorrhage, owing to the depth of the wound, the size of the arteries, and their near origin from the carotids, have not unreasonably deterred attempts at more than partial amputation of it. I believe it was Mr. Syme who first suggested an operation for its entire removal, and performed it in the presence of many members of the Association, when its meeting was held in Edinburgh. Unfortunately, that patient, as well as a second, died a few days after the operation; and a solemn warning was published by Mr. Syme, who declared that the operation was so serious that further attempts were not justifiable, as no one could recover from it. Subsequently, I believe, in a third case, Mr. Syme was, by a like proceeding, rewarded with success; and Mr. Fiddes, in Jamaica, and Dr. G. Buchanan, in Glasgow, have also succeeded by the plan laid down by Mr. Syme. However, believing that the severity of the operation depended far more upon the method of proceeding than upon the mere removal of the tongue itself, I devised what I hoped would prove to be a less formidable one, and which experience has proved to be so. Up to the present time I have removed the entire tongue nineteen times, and Dr. Fenwick, of Montreal, has done the same operation once, without any untoward symptom following in a single instance. In most cases the patient has not required any after-treatment, being able to sit up the following day, and in ten days to be considered well. In the majority of operations not a drachm of blood has been lost. In two cases only has there been any hemorrhage, and in those not more than half an ounce of blood was lost. In one a point of hot wire, and in the other a ligature, at once arrested the bleeding. The little constitutional disturbance which follows this operation is surprising; indeed, in the majority of cases there is none."—Thomas Nunneley, F.R.C.S.

seems most curious is the connection between taste and deglutition; from which it appears that the latter is essential for the full perception of the former. If the pleasure of taste could be perfectly gratified by mastication without deglutition, there would be no limit to the consumption of food; but the instinctive desire to swallow an agreeable morsel affords a check to any such abuse.

Mr. Paget reports the following case:

On the 20th of February a little girl, about three years of age, was brought into the operating theatre of St. Bartholomew's Hospital with hypertrophy and prolapsus of the tongue, which commenced when she was some six months old. It now protruded nearly two inches, and hung downward, completely filling the circle of the lips; its end was dry, and excoriated with hardened epithelium, a sort of crust having formed of the size of a shilling; several of the papillæ also were enlarged, and in places gave to the tongue a warty or granular appearance. The lower jaw had already begun to be deformed, and expanded downward and outward; the teeth were gradually separating from one another in the mental portion of the jaw, and there was dripping of saliva. An examination of the tongue by Mr. Paget showed that the organ was truly hypertrophied; the part not prolapsed completely filled the cavity of the mouth.

Chloroform was carefully given to the child, and the chain of an écraseur was passed around the tongue within the mouth, the jaws being kept open by a metal gag. The chain was slowly drawn home, and the prolapsed and hypertrophied portion was detached with little or no bleeding. On examination of the piece removed, its structure was found to be similar to that of the natural organ, both in texture and color: it was simply a redundancy of growth from hypertrophy. The subsequent progress of the case was reported as most satisfactory, a good recovery being recorded.

Partial amputations of the tongue have been very frequent. Union, in many of the cases, is very rapid and perfect. In one instance, that of a child, where a kind of a flap operation was made by the writer, reliable union resulted in a single day.

Amputation of the tongue, complete or partial, is practised with ligature, knife, or écraseur. The author, from his own experience, gives the preference to the last means.

Operations.—For a surgical study of the tongue, and the operations practised upon the organ, the reader will turn to Plate II.

Subfig. 1, in plate, is a front view of the anatomical relations of the parts about the fauces, as shown with the mouth wide open. 1, the dorsum of the tongue; 2, 3, the tonsils; 4, the uvula; 5, the anterior half arch; 6, the posterior half arch, with the tonsil between it and 5; 7, the soft palate.

Subfig. 2 represents a side view of a vertical section of the mouth and tongue, showing the relations of the vessels and nerves of the tongue. 1, the lingual artery; 2, its sublingual branch,—the veins accompanying the ar-

teries; 3, the hypoglossal nerve; 4, the ranine terminations of the lingual vessels.

Subfig. 3 represents the situation and associations of a disease compelling amputation of a section of the tongue. The lines, 1, 2, 3, form a V, which is to circumscribe the growth; it should, however, have been placed much farther back.

Subfig. 4 exhibits the operation of excising the tongue, as practised with scissors. When the knife is used the sections are similarly made. If, in such an operation, the hemorrhage be threatening, it is better to ligate quickly the vessels of one side before making a section of the other; this suggestion, however, only holds good when the bleeding orifices are freely exposed and can be reached without effort or difficulty.

Subfig. 5 shows the preceding operation completed, and the flaps united by ligatures. 1, 2, represent the sutures: wire pins or waxed silk may be used. Let them be left in only long enough to secure the union; this, if no undue inflammation supervene, will be accomplished in from twenty-four to forty-eight hours.

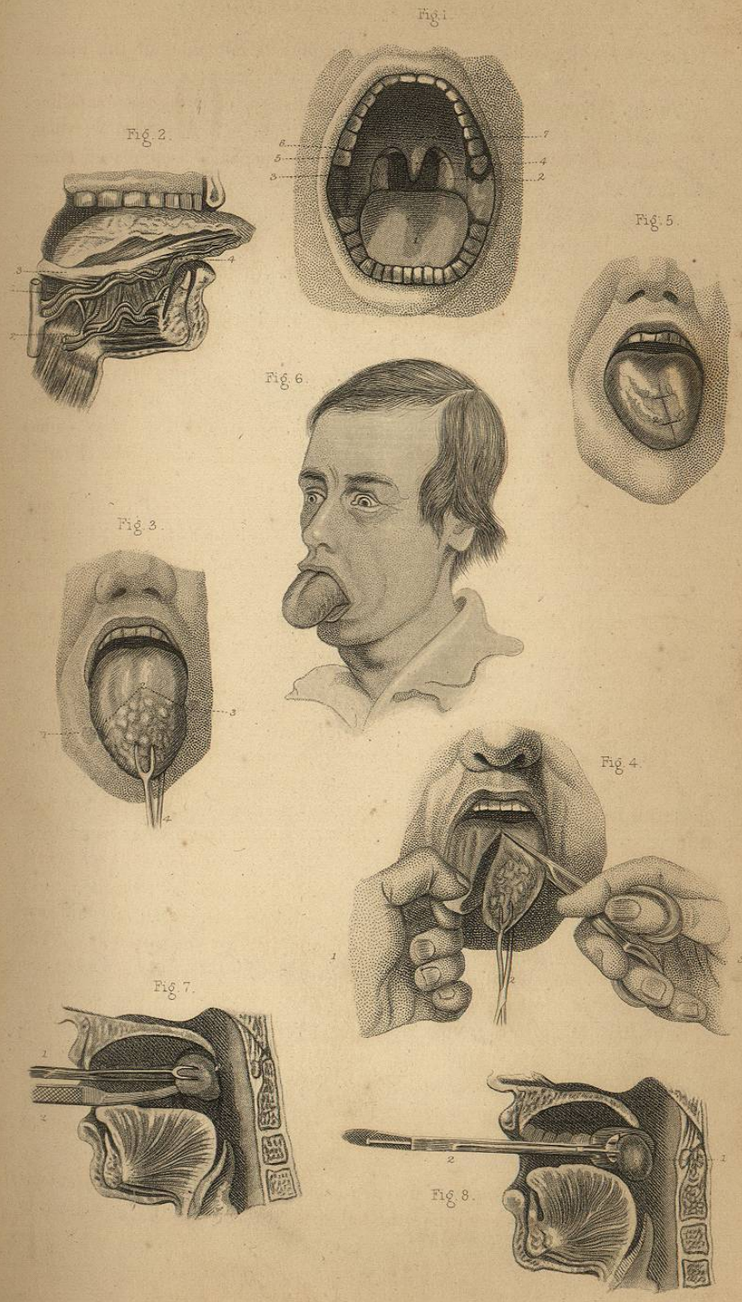
Subfig. 6 is the lingua vitula, or lingual hypertrophy. The particular case here represented was a patient of Dr. Harris, of Philadelphia, and the operation was the first performed in the United States. The case is thus described by Professor Henry H. Smith in his "System of Surgery":

The patient, aged nineteen, had the tongue enlarged at birth. A short time previous to the operation it projected beyond the upper incisors at least three inches. Its circumference was six inches, and its vertical thickness one inch and a half; it filled up the jaws so completely that it was necessary to have the food cut into small pieces and introduced at the side of the tongue.

The operation practised by Dr. Harris was accomplished as follows: The tongue being elevated, a strong ligature was passed through its tip so as to control its movements. The under surface was then dissected from the floor of the mouth about three-fourths of an inch behind the anterior part of the jaw, and a strong, straight bistoury introduced into the organ at a point where the dissection terminated, whence it was pushed through between the median line and the left ranine artery, and, being drawn laterally and forward, was made to cut a flap, which terminated near the first bicuspid tooth. The left ranine artery being then secured with a ligature, the bistoury was again introduced in a corresponding position on the right side, and the opposite, or right flap, made in a similar manner. The artery of this side being now secured, and the space intervening, or central portion, divided by strong scissors, the incisions, or flaps, resembled the letter V, and, being approximated by these interrupted sutures, made a pointed, well-formed tongue of the ordinary length. A year subsequently the patient articulated distinctly, and continued relieved of all deformity.

In another case, somewhat similar to this, under the care of the same surgeon, a ligature was applied to the enlarged portion, in order to cause it to

Plate II.



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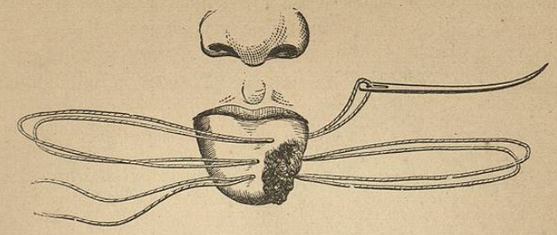
slough off; but the irritation, Professor Smith informs us, was so great that Dr. Harris found himself subsequently compelled to amputate the end of the

FIG. 387.—AMPUTATION BY STRANGULATION.

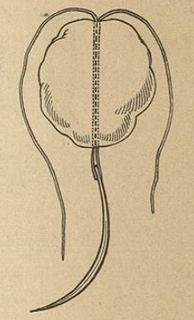


tongue with a catlin. In this patient the organ protruded four inches; its circumference was over six inches, and its vertical thickness nearly two inches.

Other figures upon the plate show manner of excising the tonsil glands, the bistoury and tonsillotome being used.

Fig. 387 represents a condition of resisting ulcer, together with a manner of treatment by strangulation. With such ulcers and such manner of treatment the author has had quite a large experience, but, as before remarked, he gives the preference to the écraseur. A mode of using the ligature, more convenient than that exhibited in the diagram, and quite as effectual, consists in the passage of the double thread, exactly as is represented in this case by the threads occupying the middle position; separating this double ligature, it may be made to circumscribe any portion of the tongue simply by the passage of pins: as, for example, if in the places of the first and second threads, as shown, pins were placed, it must be seen that by separating the double middle ligatures and casting them back of the pins, the part included would be precisely the same as found here with the six ligatures. By such use of the double ligatures the author has amputated full half the tongue twice within four months. Such a mode of employing the double ligature, not alone for the tongue, but in any other situation, is shown in Fig. 388.

FIG. 388.



The Écraseur.—Fig. 389 exhibits the écraseur of the inventor of the instrument, the French surgeon M. Chassaignac. Of the two forms shown, the one to the right will be found most to commend itself, the direction of the chain being best controlled by it. To use the écraseur, it is simply necessary to arrange the chain back of the part to be amputated, the handle being next slowly worked, whereupon the chain, little by little, is retracted, until finally—the time should seldom be less than a quarter of an hour—the portion

of tissue drops off, without, quite as likely as not, the loss of a single drop of blood. Such a bloodless ablation of the tongue was lately performed by the author before his class.

As a substitute for the chain of the Chassaignac instrument, a common annealed wire is used by many with satisfactory success. The use of such a wire is highly commended by M. Maisonneuve, of Paris, who has published a memoir on what he terms the "*ligature extemporanée.*" Fig. 390 exhibits

FIG. 389.—CHASSAIGNAC'S ÉCRASEUR.

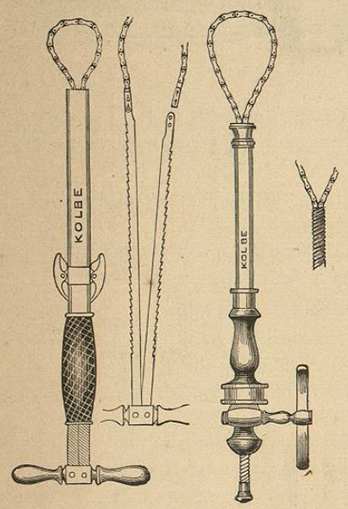


FIG. 390.
LIGATURE EXTEMPORANÉE.

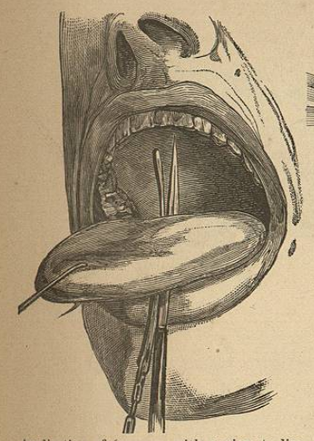
this écraseur, and the mode of its application. A screw like that of Graefe's serre-nœud, or any other convenient means, may be employed to tighten the wire. A very convenient instrument of such character is manufactured at a trifling price by Mr. Kolbe, of Philadelphia, and is to be procured of most surgical cutlers. With such form of écraseur, the author has succeeded in amputating, without trouble, fully two-thirds of the organ.

Ablation of the tongue in part by means of the écraseur is fully demonstrated by Figs. 391 and 392. In the first of the cuts is exhibited the manner of applying the instrument, which, as seen, has been threaded, or attached, to the eye of a silver probe, the probe following the thrust of a bistoury and being in place before the knife is withdrawn. In the second of the cuts, two chains, belonging to different écraseurs, are seen ready fixed for the strangulation; the retraction of the chains within the handles cuts the piece out; the loop held by the finger in this diagram is a replacement of the

tenaculum seen in the other; either being used alike with the common purpose of securing control of the organ.

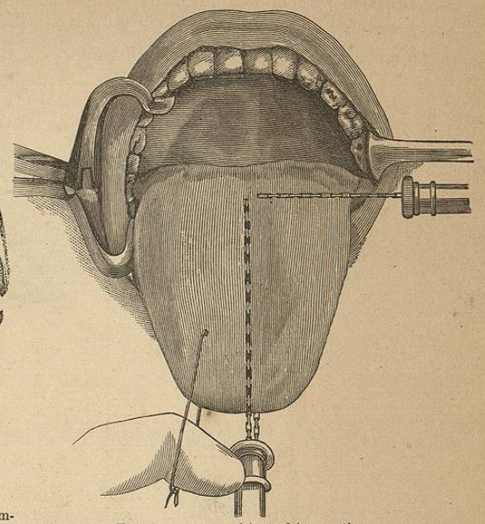
Ablation of the tongue in full, an operation now attracting considerable

FIG. 391.



Application of écraseur with a view to limited section.

FIG. 392.



Two écraseurs used in making sections.

attention, is variously practised. A mode known as that of Regnoli, shown in Fig. 393, consists in opening into the oral cavity from the neck, and, by means of a loop in the tip, drawing the organ downward. To open into the cavity by this plan, the operator commences by making a curvilinear incision corresponding to the arch of the jaw, extending nearly from angle to angle. Joining this first incision is a second of vertical direction, extending to the hyoid bone. The flaps are next to be reflected, and, after incising the lingual muscles from the bone, the tongue is caught by the tip and drawn out of the mouth. Control of the organ being thus secured, the knife or écraseur is employed to make the separation.

A second manner of operation is that which was practised by Mr. Syme. This is shown in Fig. 394, and is as follows. A first incision divides the lower lip in its exact median line, being carried down to the hyoid bone. Next the maxilla, by means of a saw, is separated at the symphysis; this may or may not necessitate the removal of the two front teeth. Placing the finger as a guide beneath the tongue, the surgeon next incises the mucous membrane, together with the muscular attachments. At this stage attention is to be given to hemorrhage. The tongue, as shown, is to be drawn forward and the amputation made by the écraseur.

Statistics favor the Regnoli operation rather than that by Mr. Syme; the section of the jaw made by the latter complicates to a marked extent the process of cure.

Still another operation, one practised by Mr. Nunneley, of Leeds, has

FIG. 393.—REGNOLI'S OPERATION.

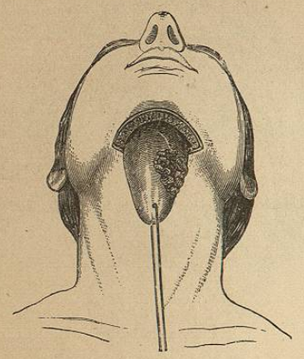
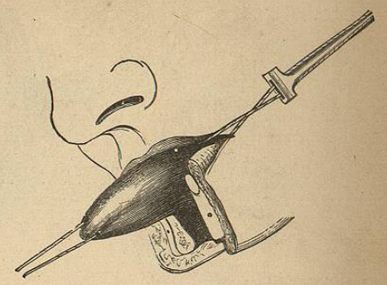


FIG. 394.—SYME'S OPERATION.



yielded a success most satisfactory, since of nineteen cases in which this surgeon has operated, removing the whole or a large portion of the tongue, every one survived the performance. The manipulations, as practised by Mr. Nunneley, consist in a slight incision, a puncture, indeed, made in the exact middle line of the throat,—a little nearer the base of the jaw than the hyoid bone, the bistoury being passed upward until it emerges at the frænum. Through this wound is drawn up the chain of the écraseur, the loop being cast about the base of the tongue. Next, with a volsella, or by any other convenient means, the organ is pulled outward and upward. To control and secure the loop of the chain about the base, two strong curved pins are passed from below, through the tongue, to the base; the loop thus controlled, ablation is made as in the previous cases. See Fig. 395.

A fourth process is that practised by Mr. Paget. Separating first the general attachments of the genio-hyoglossal muscles, this surgeon dissects along the floor of the mouth, thus liberating the tongue, whereupon the organ is caught, drawn forward, and removed with the écraseur. See Fig. 396.

In limited ablations, the surgeon, not having at his command the écraseur, may use with satisfaction the ligature as illustrated a few pages back. A point of importance, however, to consider in the use of that means, is the danger of cutting the string out; it is really a nice point to draw it tight enough, yet not too tight. The author has seen a ligature cut through a tongue almost with the facility of a knife, complicating matters most seriously by the hemorrhage which followed. Another matter is correspondence in size of the thread with the needle used. A needle, larger than the thread which

is to occupy the line of its passage, will not infrequently have its use associated with an oozing of blood, so persistent as to compel the repetition of an operation.

In the use of an écraseur the surgeon will also not infrequently find him-

FIG. 395.—NUNNELEY'S OPERATION.

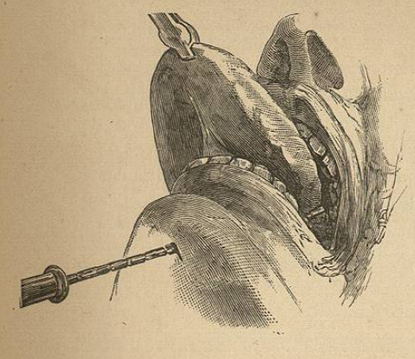
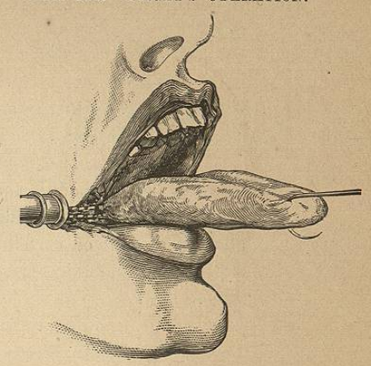


FIG. 396.—PAGET'S OPERATION.



self confronted by hemorrhage, and particularly is such a result to be anticipated where abundance of time is not allowed for the ablation: the rule with this instrument should be, "make haste slowly."

Billroth's method of amputating the tongue, a method in favor with many surgeons, begins with the ligation of both lingual arteries, the vessels being reached by a curved incision upon the submaxillary region of the neck, which starts below the anterior border of the masseter muscle, is carried down to a level with the hyoid bone, and is extended from this to the locality of the genial tubercles. The cut passes through the integuments, exposing and opening the envelope of the submaxillary gland, which body is pushed out of the way, and an incision made through the hyoglossus muscle, the vessel being exposed and lifted in a triangle formed above by the hypoglossal nerve and below by the converging bellies of the digastric muscle. The arteries secured, and the circulation thus shut off from the tongue, the jaws are widely separated by means of a convenient gag, following which a strong ligature is passed through the organ, and looped, with a view of securing control. Ablation here commences, a pair of stout and sharp scissors being used. First the frænum is divided. Next a blade of the instrument is thrust through the hole thus made, below the mucous membrane relating the tongue and floor of mouth, which membrane is divided back to the epiglottis. A succeeding step disparts the hyoid muscular attachments from before backward, following which the organ is freed and lifted from its bed. Limited bleeding attends the operation, a compress of sponge being found sufficient for its control. Nutrition is effected for five or six days after the operation by means of an india-rubber tube passed through a nostril into the œsophagus.