

million border borrowed from the upper lip, the result will be excellent, although the oral aperture may temporarily be materially decreased in size. To accomplish

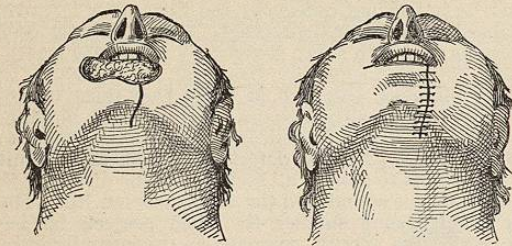


FIG. 3998.

the same end Serre, in an extensive epithelioma of the lower lip, practised Chopart's operation, preserving the mucous membrane of the lip for a covering to the flap.

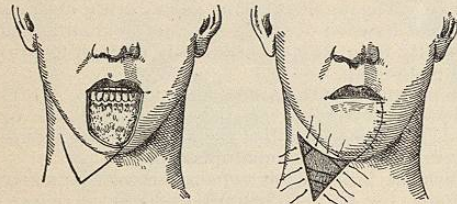


FIG. 3999.

It is almost needless to say that it is only in exceptional cases of very superficial neoplasms that this method is at all applicable.

When the defect after removal of an epithelioma is triangular, with base involving the greater part of the lip, the operations of Dieffenbach or Malgaigne may be pro-

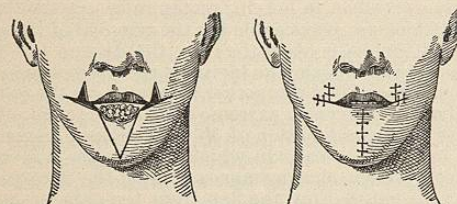


FIG. 4000.

fitably resorted to. That of the German surgeon consists in making an incision on each side from the angle of the mouth toward the masseter and in the line of the labial fissure. The length of the horizontal incision is half that of the base of the defect. The quadrilateral flaps thus raised are brought together in the median line by their

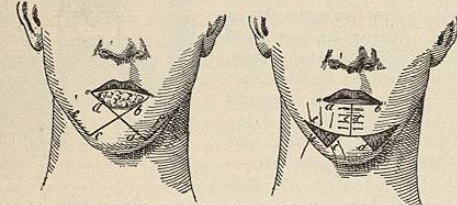


FIG. 4001.

internal borders. The operation of Malgaigne differs from this in that he refrains from the use of the perpendicular incision. To overcome the redundancy of the upper lip, a triangular portion may be excised (Fig. 4000). In either operation the new lip can easily be lined with mucous membrane, if that of the cheek be di-

vided at a higher level than the integument in the horizontal incisions from the angles of the mouth. In cases in which the defect is triangular and shallow its closure by later incisions, after the method of Syme, presents many advantages. By this method the incisions are prolonged downward and outward for an inch, whence they are carried upward and outward for a varying distance. The flaps thus outlined are dissected off the bone and brought together in the median line. The mucous membrane and skin are stitched together along the upper edge, and the triangular interval on each side is left to heal by granulations. To facilitate union of the flaps, the tip of the spur left below the apex of the defect may

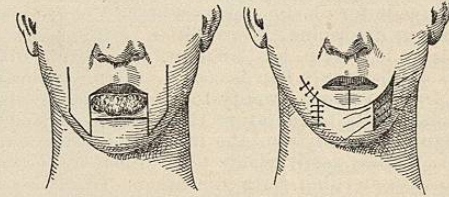


FIG. 4002.

be removed after the flaps have been raised (Fig. 4001) (Nélaton). The very great advantage of this method over those preceding it is that, since the integument covering the chin is not disturbed, the flaps cannot sink or be drawn downward toward the neck, and the new lip will maintain its original height. Quadrangular defects of the lower lip may be successfully overcome by resorting to two rectangular flaps taken from the chin or from the side of the chin. Sédillot (Fig. 4002) made the flaps at right angles to the line of the mouth from the side of the chin, while Bruns preferred to make them obliquely and from the cheek. When the flaps are raised they are

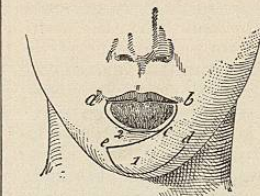


FIG. 4003.

turned on their respective pedicles, when their inner borders meet in the median line. When circumstances permit of a choice between the method of Sédillot and that of Bruns (Fig. 3984, diagrammatic), the former should be preferred, since in the latter there is considerable danger of traction on the cheeks with a resulting deformity. The operation of

Sédillot also offers a better opportunity for covering the upper edges of the flaps with part of the vermilion border of the upper lip. When this is severed for half an inch or more on each side from the upper lip, the flaps forming the lower lip can be almost entirely covered. Schuh's practice of tattooing the edge of the lip for cosmetic purposes has probably never been followed by other operators. In 1869 Langenbeck first practised a cheiloplasty which has gained many followers in Germany. In this method the diseased lip is removed by a curvilinear incision (Fig. 4003). A flap is then prepared from the integument of the chin (1) the base of which is on the side of the oral angle. The free extremity of the defect is not directly under the oral defect, but separated from it by a triangular portion of skin (2). Both flaps being raised, the lower is elevated into the defect, while the other is utilized in closing the breach below (Fig. 4004). The presence of the spur prevents the sinking of the lip.

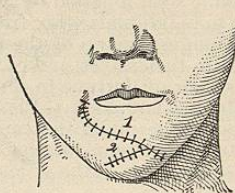


FIG. 4004.

When it is desirable, the upper edge of the flap may be covered with a portion of the mucous border of the upper lip. Gurdon Buck ("Rep. Surg.," p. 22), and Est-

länder (*Arch. f. Chir.*, xii.), closed defects of the lower lip with flaps taken from the upper. Buck, after removing the growth by a V-shaped incision, or by one horizontal and two perpendicular incisions in more compli-

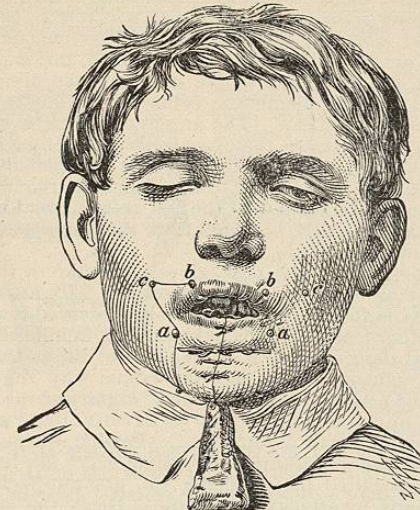


FIG. 4005.

cated cases, brought the sides of the gap together directly, or, in the case of the quadrangular defect, by forming two horizontal lateral flaps which were secured to each other in the median line by pin sutures. After closure of the wound had been effected, a secondary operation was performed to transfer the redundant tissue of the upper to the deficient lower lip, and thus to restore the symmetry of the mouth. This operation is performed as follows: A point is selected about a finger's breadth below, and a little without, the oral angle on each side, and marked by the insertion of a pin through the skin. Another pin is inserted on each side at the junction of the vermilion border of the upper lip with the skin, about one-fifth of the distance from the angle of the mouth to

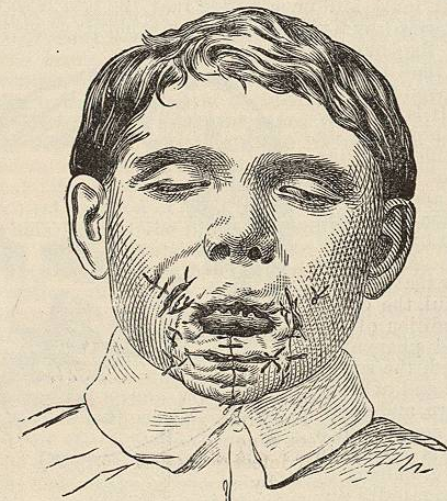


FIG. 4006.

the median line of the lip; and a third pin on each side is inserted into the integument of the cheek, about an inch and a half above and without the angle of the mouth. The points indicated by the first and third pins are then

to be united by an incision through the entire thickness of the cheek, and in like manner the points indicated by the second and third pins. A triangular flap is thus formed, with its base toward the angle of the mouth. From the point indicated by the first pin, a vertical incision is now made to the base of the jaw. The integument in this region being in a state of great tension, the edges recede and form a space for the reception of the

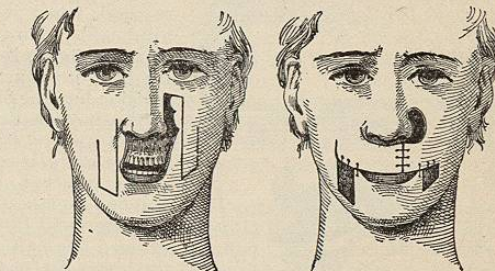


FIG. 4007.

triangular flap, with its apex toward the base of the jaw, and its base, including a portion of the vermilion border of the upper lip, supplying the deficiency of the corresponding side of the lower lip. When the operation on both sides is completed the configuration of the mouth is nearly normal. (Figs. 4005 and 4006, from Buck.)

Estländer's operation differs from that of Buck in that the outer incision is curvilinear, and that the plastic operation at once follows the extirpation of the tumor.

(2) In reconstructing the upper lip, the operator has the choice of a number of methods. In cases of total deficiency, the method of Bruns, already referred to (Fig. 3984), yields excellent results. Bérard utilized two lateral flaps from the cheeks, including them between parallel horizontal incisions, carried outward to the masseter, the upper from the angle of the nose, the lower from the angle of the mouth. The flaps thus formed are brought into position by gliding, and united by pin sutures in the median line. A better operation for severe cases is that of Sédillot (Fig. 4007), which is performed as follows: On each side of the oral angle a quadrilateral flap, of the width and half the length of the lip, is outlined by two perpendicular incisions and one horizontal incision on each side. The inner of the perpendicular incisions is carried higher than the outer. When the flaps have been thus outlined, they are raised from the underlying tissues. The entire thickness of the cheek is

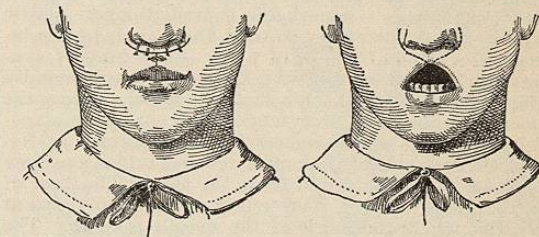


FIG. 4008.

included in the flaps, which are therefore lined with mucous membrane. When the flaps are brought into position, their lower borders meet in the median line, the inner borders are sutured to the upper margin of the defect beneath the nose, while the outer borders assume the position of the free border of the lip. With a little traction the mucous membrane and the integument of this border can be united by a number of very fine sutures.

When the defect of the upper lip is central and not very extensive, the method of Dieffenbach presents much to recommend it. It consists in transfixing the cheek on each side of the angle of the nose, and forming a flap on

each side by a curvilinear incision (Fig. 4008). When these flaps are raised from their attachments to the alveolar border, they are easily brought into apposition by their internal margins in the median line. The method

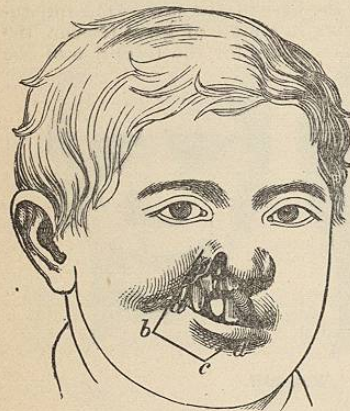


Fig. 4009.

of fixing the flap beneath the nose is also shown in the illustration. The advantage of this method, when it is applicable, is in the greater height given by the curvilinear incision into the flap in the median line, and in the fact that its free border is naturally covered by mucous membrane. Ledran and Roux utilized one-half of the lower lip for repairing deformities in which the outer half of the upper lip was lost. Both of these operators transplanted a quadrangular flap with its pedicle outward. This method was greatly improved upon by Buck, who, placing the pedicle internally, temporarily reduced the length of the oral fissure. This method of operation is shown in Fig. 4009. The extremity of the lower lip, where it joins the right cheek, is divided through its entire thickness at right angles to its border, and for a distance of an inch (*a b*). A second incision is made from the end of the first, parallel to the labial border, for a distance of one inch and a half (*b c*); from *c* a short incision (*c d*) is made toward the free border of the under lip, and parallel to the incision (*a b*). The quadrilateral flap thus formed from the lower lip is now turned upon its pedicle to meet the remaining portion of the upper lip, to which it is attached by its free extremity (*a b*). Fig. 4010 shows the result of this operation, and the method of overcoming the deformity of the angle of the mouth which results.

3. STOMATOPLASTY.—Destructive ulcerative processes about the lips and angles of the mouth occasionally give rise to deformities which, by greater or less closure of the oral aperture, interfere with the process of mastication, and eventually threaten the life of the individual. In extreme cases the labial fissure is contracted to a degree which compels the patient to live on liquid food alone. Until Dieffenbach's remarkable contributions to plastic surgery, it was customary to treat these cases by the insertion of a seton of silk or of wire. As in cases of syndactylism treated in this way, the result was generally unfortunate. Dieffenbach's method, which, unless the mucous membrane is everywhere adherent to the alveolar border, is as a rule successful, is performed as follows: On each side of the contracted oral orifice a narrow triangular strip is excised from the skin. The base of the triangle is internal, its rounded apex external and at the point where the angle of the mouth is to be. The excised triangular portion should include everything down to the mucous membrane, which remains intact in the floor of the wound. The mucous membrane is then divided in the floor of the triangle, thus forming an upper and a lower flap, which, when everted, will clothe the free borders of the new lips and meet externally at the angle of the mouth. The excess of mucous membrane is thus utilized in forming the vermilion borders of the lips.

Buck's method of stomatoplasty, already alluded to, differs somewhat from that of Dieffenbach. He makes an incision along the line of the vermilion border, circumscribing half of the mouth, and extending to an equal distance above and below (Fig. 4010, *a b*). This incision should divide the skin and subcutaneous tissue,

but not involve the mucous membrane. A sharp-pointed double-edged knife is then inserted between the skin and the mucous membrane, and these parts are separated from each other as far outward as the point proposed for the angle of the mouth. The skin alone is then divided with strong scissors along the line which is to separate the upper from the lower lip (*c d*). The mucous membrane is next divided along the same line, but not so far outward, the difference in the length of the division of skin and mucous membrane being a little less than the thickness of the cheek. The angles at the outer ends of the two incisions are then carefully united by a single-thread suture, and the operation is completed as in Dieffenbach's method. To accommodate the mucous membrane to the borders of the lips, thin slices of integument must, as a rule, be pared from the upper and lower borders of the wound.

RHINOPLASTY.—The nose gives character to the face by its prominence and central position. Its absence or deformity is therefore more naturally observed than that of any other feature. It is only through familiarity with the nasal defects caused by syphilis or lupus that one without unusual vanity can understand why Tagliacozzi devoted a special chapter to the "dignity of the nose," and can appreciate the saying of Lavater, that "a beautiful nose is worth a kingdom." Passion, disease, love of honor, and punishment for crime, have all, in times past, contributed to producing the greatest facial disfigurements by attacking the nose. Hence the surgical art was taxed early to repair the deformed part, and rhinoplasty became the foundation of plastic surgery in general. In previous centuries, when the loss of a nose was a punishment for crime, or was voluntarily inflicted to preserve virtue, rhinoplasty was doubtless a more common operation than now. Sixtus V. freed Rome of its bandits by cutting off the noses of all who were caught. The Abbess of St. Cyr disfigured herself and forty of her nuns in the same manner, to preserve their virtue when the Saracens raided Marseilles. In our more civilized times, nearly every case requiring rhinoplasty is one in which the defect is the result of disease; although, in exceptional instances, a vicious bite or, as in Germany, a duel, is the cause for plastic interference.

Notwithstanding the accumulated experience of generations of surgeons, and the closest attention to every technical detail that could further the results of rhinoplasty, it must still be admitted that the best nose that can be formed by a plastic operation is hardly as presentable as the natural feature that is even far removed from the ideal. It is far preferable, however, to the artificial nose formed of vulcanized rubber, and retained in position with collodion or by means of a spring. After a rhinoplasty that is at all successful, the catarrhal condition of the nose and pharynx is improved, the senses of smell and of hearing return, and the irritating cough which so often is present in extensive defects of the nose, rapidly disappears. A successful rhinoplasty is productive of benefits which cannot follow the use of any nose fashioned by prosthetic skill.

Since the time of Dieffenbach, rhinoplastic operations have been divided into the total and the partial. It is particularly in partial rhinoplasty that great strides have been made within the last half-century. To consider systematically the different operations for repair of the

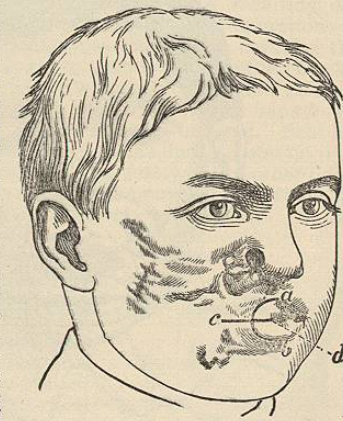


Fig. 4010.

nose, nasal deficiencies, according to Gross, may be classified as follows: (1) Loss of the entire organ, bones as well as soft parts. (2) Destruction of the whole or greater portion of the cartilages, the bridge remaining intact. (3) Mutilations of the tip, as when a small piece is cut or bitten off, including a part of the wings. (4) Loss of one wing, either alone or together with the nasal column. (5) Perforation of the nose, either on top or at the side; in the latter case with or without participation of the cheek. (6) Sinking of the organ from destruction of the cartilaginous septum of the nose, the soft structures being but little, if at all, affected. (7) Loss of the column. (8) Mutilation of the nose and upper lip, or the nose, lip, and cheek.

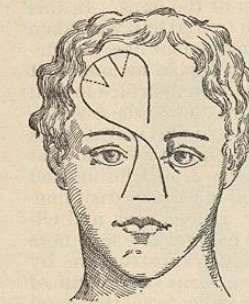


Fig. 4011.

When the entire nose has been lost, there is generally a large pyriform aperture which allows free inspection of the nares and nasopharynx. For the alleviation of this condition, it is always best to fashion the nose from a flap taken from the forehead, by what is known as the Indian method. Before proceeding to a total rhinoplasty, the defects should be covered with a model of clay, wax, or dough, which should approximate as much as possible in size and form an ideal nose. Over this is accurately fitted a piece of soft leather or moleskin plaster, the lower margin of which is pressed into the nostrils and made to cover the nasal column. The shape of this piece of leather or plaster, when removed from the model, is pyriform, with its base below and apex above. A second piece of leather or of plaster, one-third larger in all its dimensions, should then be prepared from the first, the increased dimensions being allowed for shrinkage. The model thus prepared, when applied to the forehead, is shown in Fig. 4011 (Linhart). The plastic operation proper is preceded by freshening the edges of the defect. This must be done as liberally as possible, in order to procure a wide surface of contact for the flap. The vivified border should everywhere measure one-third or even half an inch in width. When this step of the operation is completed, the leather or moleskin model is applied either perpendicularly or obliquely to the forehead. The latter is probably the better method, since less rotation of the flap is required to bring it into position. When the forehead is decidedly low, no alternative is presented to the operator, since the central excision of the flap would necessitate the inclusion in it of a considerable portion of the hairy scalp. König and others maintain, however, that the frontal scar resulting from central location of the flap is less disfiguring than that which follows the other procedure. Lisfranc, Linhart, and von Langenbeck prefer to take it from the side. When the operator has applied his model in the desired position, an incision down to the periosteum is carried around it. The incision, as shown in the figure, begins at the right margin of the defect, is carried obliquely over the right eyebrow, and descends on the left side of the model, terminating above the internal end of the left brow. In terminating this incision, it is essential not to interfere with the angular artery, since the vascular supply of the new nose, in a large measure, depends upon the integrity of this vessel. The pedicle left between the ends of the incisions should measure from one-half to three-fourths of an inch in width. The flap thus outlined is now rapidly raised, being made to include, besides the integument, the aponeurosis and fibres of the occipitofrontal. In the lower part of the flap the periosteum can safely be included. Langenbeck included it in the entire width of the flap, except in the parts of which the column and alae of the nose were to be formed. When hemorrhage from the edges and raw surface of the flap has been controlled, it is rotated into position in such a

way that the raw surface looks backward, and its base naturally comes in contact with the freshened margin of the upper lip. The next step of the operation is the formation of the septum and alae. This is readily accomplished by two oblique incisions, one inch in length (dotted line in Fig. 4011), which, running toward each other, are separated at their central ends by an undivided interval nearly an inch wide. When the triangular flap included between these incisions is doubled upon itself, the column and septum of the nose are perfectly formed. By an upward duplication of the lateral parts of the flap, the alae and nostrils are next formed, and maintained by transfixing sutures. To facilitate the closure of the frontal wound and to obtain larger nostrils, Langenbeck does not remove the small triangular portions seen on each side of the base of the flap, but makes the central portion, from which the septum is made, rectangular and one inch wide. When the nose has thus been formed and the raw surfaces have been thoroughly cleansed, the new organ is brought into position and retaining sutures are applied. The most important sutures are those which hold the alae of the nose to the cheek and the septum to the upper lid. For each wing and the septum three sutures are requisite; for the wings one externally, one internally toward the nostril, and one beneath toward the lip. Since it is the septum that most frequently fails to unite with the upper lip, unless extraordinary care be taken, it is advisable to make a special groove in the central part of the upper lip, three to five lines in length, into which the lower end of the septum is firmly implanted after it has been divested of cuticle. The operation is then completed by suturing the lateral margins of the new nose to those of the cheek, particular care being given to securing a good apposition of the pedicle in the upper end of the defect. If the wound in the forehead is very large, it may in part be closed by sutures, although the greatest caution must be observed to prevent traction on the pedicle. If the entire wound of the forehead is left to granulate no harm results, and the scar is probably not more ungainly than that which follows what is ordinarily an unsuccessful attempt at obtaining its closure by primary union. To maintain the patency of the nostrils, and at the same time to further adhesion of the double integumentary folds, it is well to introduce portions of a drainage tube into the nostrils after the operation is complete. The new nose may then be lightly covered with oiled silk and antiseptic gauze or lint, care being taken that no foreign material becomes adherent to the sutures.

There are rare cases in which previous disease has unfitted the integument of the forehead or of the cheek for rhinoplastic purposes. Under such circumstances only is one justified in resorting to the Italian operation of rhinoplasty from the arm. The first step in this procedure is to outline a flap of integument from the inner surface of the middle of the arm, measuring four inches in length and three in width. The flap is raised between two parallel longitudinal incisions, but retained above



Fig. 4012.

and below in relation with the remaining integument. To prevent reunion a piece of oiled lint is placed underneath the flap. The inflammatory process which follows the elevation of the flap causes this greatly to increase in thickness, while its inferior surface, in from two to three weeks, becomes clothed with granulations and eventually cicatrized. When, after the lapse of this time, the flap is sufficiently thickened, its upper connection with the arm is severed by a transverse incision which leaves a wide raw margin at the upper end of the flap, which is sutured to the vivified margins of the nasal defect. This part of the operation Tagliacozzi usually performed in the fourth week after the first operation. Since it requires from one to two weeks before the lower end of the flap can be safely severed from the arm, the latter must be supported in relation with the head and face. Fig. 4012 shows Tagliacozzi's method of accomplishing fixation of the arm by means of a cap and jacket. Wutzer's apparatus for obtaining a similar end is shown in Fig. 4013. In taking the skin from the forearm or back of the wrist, he found it necessary to support the arm and forearm in splints. When such an apparatus has been worn for from one to three weeks, the upper end of the flap will have become

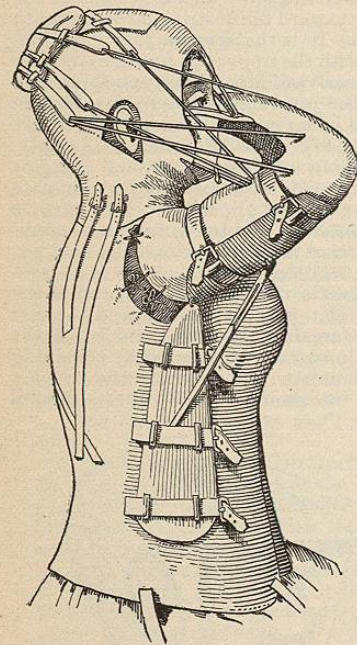


FIG. 4013.

firmly united to the apex and sides of the triangular nasal defect, and it is then safe to sever its brachial connections, when the formation of the wings and septum can be completed as in the Indian method. Graefe modified the Taliacotian operation by at once fixing the flap to the vivified edges of the defect, thereby apparently curtailing the period of fixation of the arm. This, which is known as the German method, has found even fewer followers in recent times than the older operations. It manifestly gives greater opportunity of shrinkage of the flap and subjects the patient to the annoyance of a large suppurating surface near the mouth, which by the older operation is cicatrized before it is transplanted. Dieffenbach exceeded both Tagliacozzi and Graefe in the extent to which he reformed the nose from a brachial flap, in that the entire nose, with the exception of one ala, was formed as the first step of the operation. After shrinkage and cicatrization had followed, the actual transplantation of the nose was effected in from six to eight weeks.

The operations thus far described, unless gangrene supervene in the flap, effectually close the nasal defect. For the most part, however, the newly formed nose, irrespective of its original prominence, sinks and contracts until eventually little more than an integumentary curtain closes the defect. To obviate this result a number of procedures have been adopted, among which that of Thiersch probably deserves most prominent mention. As the first step of the operation, he forms on each side of the defect a rhomboid flap from the cheek, the attached base of which is in relation with the freshened edge of the defect, its free border being external. When these flaps are raised from the cheek on each side they are in-

verted, so that the cutaneous surfaces look toward the nares, the raw surfaces outward, and in the median line are in contact with each other. The nostrils and septum being thus formed, a frontal flap is brought down to cover the flaps from the cheeks, the operation being completed in the ordinary way. Verneuil procured a permanent elevation of the bridge of the nose by a somewhat similar operation of superposition of the flaps. In this case the frontal flap was taken from the median line, and deflected in such a manner that the cutaneous surface looked backward. Over the raw surface two quadrilateral flaps from the cheeks were brought by a process of gliding and united along the median line. Finally, Langenbeck and Ollier have given the new nose an osseous substructure by sawing a strip one-fourth of an inch wide from the nasal processes on each side. This strip, after being broken through its attachments below, is deflected toward the median line, where it meets

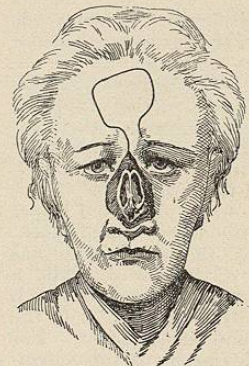


FIG. 4014.

its fellow of the opposite side. If the nasal bones are present and only depressed, which they generally are, they must be brought into position by the free use of the elevator.

Quite recently König (*Langenb. Arch.*, vol. xxxiv., p. 165) presented to the Congress of German Surgeons a method of obtaining an osseous framework for the repair of sunken noses, and for the permanent elevation of the nose after total rhinoplasty. The method is virtually one of superimposed flaps, both being taken from the forehead. A median flap of the requisite length and half an inch in width is formed from the forehead in the median line. The incisions bounding this narrow strip are carried down to the bone. When this flap is raised the external table of the frontal bone is raised with it as far as the root of the nose. The flap thus elevated is inverted, so that the cutaneous surface faces the nasal fossae. Over the raw external surface a second frontal flap is then placed and fixed as in the ordinary Indian operation. In four cases in which König performed this operation for a sunken condition of the nose, the repaired organ retained its solidity after from one to nearly four years had elapsed from the time of the operation.

The partial destruction of the nose also presents many interesting peculiarities that require partial rhinoplasty.

When the tip and ala of the nose are intact, while the body and bridge are lost, the defect should be closed by a frontal flap (Figs. 4014 and 4015). In this case Linhart removed an epithelioma involving almost all the cartilages and a portion of the bony framework of the nose—only the margin of the nostrils on each side was preserved. Mutilations of the tip of the nose can also be repaired by a frontal flap. Figs. 4016, 4017, and 4018 illustrate the defect and the results of operation in a case of Buck's, in which the tip of the nose was bitten away. In this case the freshening of the edges of the defect was followed by the elevation of the patch of skin above the defect as far as the root of the nose between the eyebrows. A frontal flap of requisite length and width was then brought into



FIG. 4015.

lost. To repair this defect the integument of the root of the nose, of the glabella, and of the internal angle of the orbit was utilized by Busch (Fig. 4020). The pedicle of

the flap is placed on the healthy side of the nose, low down, and on a level with the defect. When the flap is brought into position, its lower portion forms the tip and column of the nose, while its upper part, when duplicated, replaces the lost ala. The repair of defects of the nasal wings can be accomplished by a number of procedures. When the defect is long but narrow, it is prob-

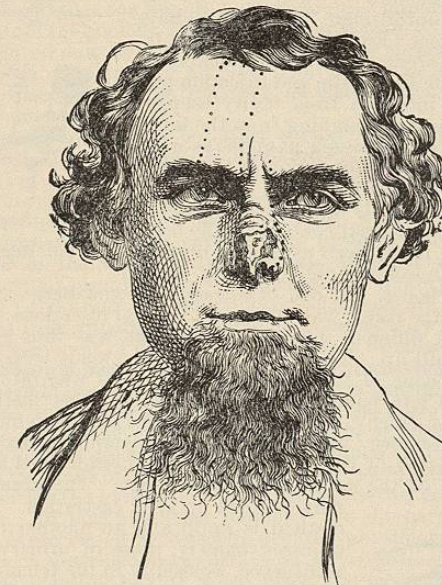


FIG. 4016.

ably best, as Dieffenbach taught, to refrain from attempting a plastic operation, and to produce a similar defect on the opposite wing. In some cases it is advisable to excise the defect in a triangular way, and to close the breach with a flap from the side of the nose. Fig. 4021 illustrates the method of obtaining it and the incisions (dotted lines) necessary for placing it in position. In larger defects of a nasal wing it is advisable to procure

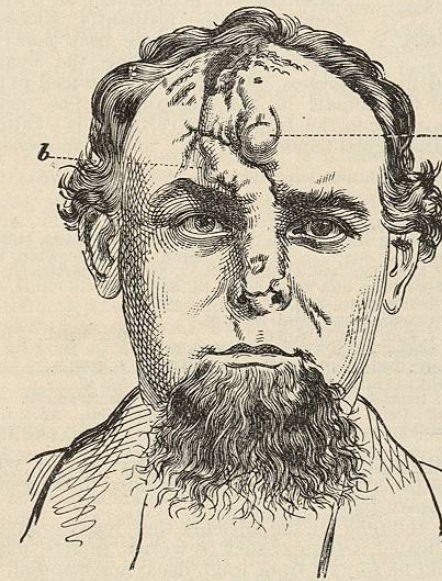


FIG. 4017.

flap, quadrilateral in shape, from the cheek or from the upper lip. In Figs. 4022 and 4023 the method of Bonnet is shown; to give the angle of the nose a more shapely

lost. To repair this defect the integument of the root of the nose, of the glabella, and of the internal angle of the orbit was utilized by Busch (Fig. 4020). The pedicle of

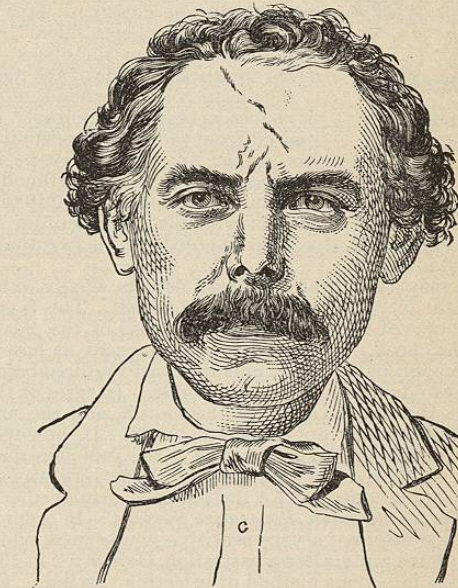


FIG. 4018.

flap, quadrilateral in shape, from the cheek or from the upper lip. In Figs. 4022 and 4023 the method of Bonnet is shown; to give the angle of the nose a more shapely

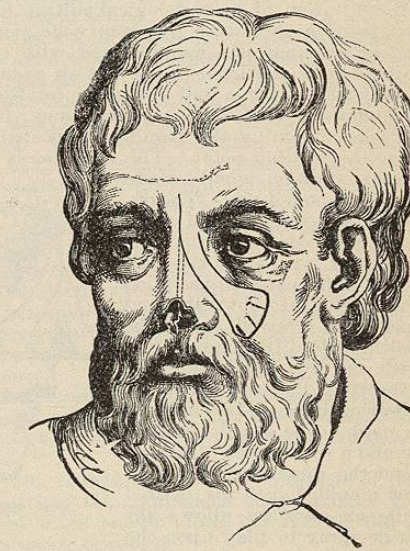


FIG. 4019.

lost. To repair this defect the integument of the root of the nose, of the glabella, and of the internal angle of the orbit was utilized by Busch (Fig. 4020). The pedicle of

form, and to facilitate the rotation of the flap, a wedge-shaped portion (b) may be excised from the base of the flap. In this operation the vermilion border of the flap must be removed, and the fissure in the lip is to be closed at once. Perforations of the nose resulting from wounds or ulcerative processes are generally seated at the sides of the nose. They may readily be closed by flaps of suitable shape and size, taken from the forehead, from the cheek, or from the opposite side of the nose.

The nasal column, when it alone is defective, can be admirably repaired from the central portion of the upper lip, which must be included between parallel perpendicular incisions. When the flap thus formed is brought in contact with the nasal septum, its mucous surface is of course exposed, and is eventually converted into skin.

In the most complicated of nasal defects, finally, other parts of the face are also, as a rule, deficient. This is particularly true of the upper lip, of portions of the palate, and of the cheek. In such complicated cases, as has already been intimated, many operations are required before the face can be made at all presentable. In cases of this character the lip, the angle of the mouth, and the nose all require separate operative treatment. If, however, from one to three years be devoted to the judicious management of such a case, the result will in every way repay patient and operator for the patience displayed.

**Paraffin Injections in Reparative Surgery.**—In order to fill up the scrotum of a very sensitive young man, which had been left empty after a castration, Gersuny<sup>15</sup> in 1900 devised the ingenious method of injecting vaseline. Encouraged by the good result obtained in this case, he extended the procedure to cases in which other than the distinct cosmetic effect was desired. The result which Gersuny<sup>16</sup> obtained in a case of urinary incontinence in a female, which had resisted all other methods of treatment, was so brilliant that other surgeons at once took up the new procedure, and so its use soon became widespread. A considerable amount of good work has been done at von Bergmann's Klinik by Stein.<sup>17</sup> He prepares paraffin, which should have a melting point between 42° and 43° C., by melting and filtering with a hot-water funnel, such as is used in the filtration of bacteriological culture media. The filtered paraffin should be put into wide-mouthed flasks, such as Erlenmeyer's, and plugged with cotton wool. In these it is sterilized in the hot-air oven at a temperature of 200° C. for a half-hour, and can then be preserved indefinitely, ready for use at any time. Before using, the flasks containing the paraffin are heated in a water-bath to the melting point. The injection is made with a Pravaz syringe, wholly made of glass, holding about 1 gm. The object is to have a syringe devoid of all sharp corners and edges, so that the paraffin does not so easily congeal. Before injecting the paraffin, the filled syringe is again put into hot water and then the needle is screwed on. The injection is made by lifting up a fold of skin with the left hand and with the right inserting the needle and injecting slowly until the desired amount has been used. The needle is then withdrawn and a small piece of plaster fastened over the puncture. The paraffin is now moulded into the desired shape, while an assistant allows the ethyl chloride spray to play upon the part. Several injections may be made at different times, but care must be used not to insert the needle over the area previously injected, as it should be inserted to the side of it. According to Juckoff<sup>18</sup> paraffin after its injection acts like any foreign body, and causes a reaction-

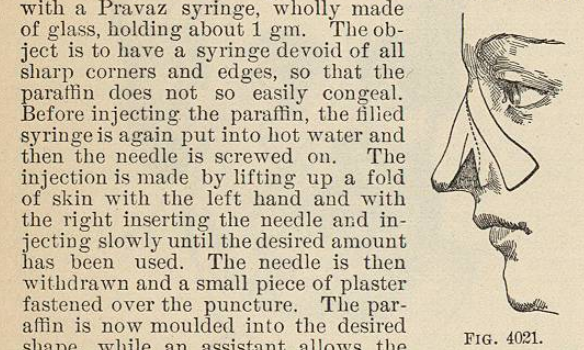


FIG. 4020.

ary inflammation with the formation of new tissue. Some of the paraffin is absorbed here and there, so that finally we have the mass pervaded by connective-tissue strands, which emanate from a fibrous capsule around the whole. This capsule is fused with the adjacent tissue.

This excellent method is not without a small amount of danger. The following unfortunate occurrences have taken place: Embolism of lung and intestinal organs from the accidental insertion of the needle and injection into a vein; infection from faulty asepsis; gangrene and sloughing from the introduction of too much paraffin, as a result of which obliteration of the blood-vessels has occurred.

The method is applicable to cases in which the normal contour of the body is lost. It has been used with distinct benefit in saddle nose following caries of nasal bones. In one case treated at von Bergmann's Klinik, the result was striking. Several injections were made at different places and the nose was thus gradually built up. The injection should be made with care so that none of the paraffin shall find its way into the orbit. Cleft palate may be treated by this method, which is chiefly applicable to those cases in which a small foramen has remained after staphylorrhaphy. The contour of the cheek might be re-established after removal of the superior maxillary bone. The scrotum may be filled up after castration. The method is applicable to another class of cases, namely, those of urinary incontinence, especially in the female, in which condition a ring of paraffin is injected about the neck of the urethra so as to replace the sphincter. A cystocele has also been treated, with distinct benefit, by injections between the vagina and bladder wall. By establishing a paraffin depot around the rectum fecal incontinence has been cured. The method is still new and sufficient time has not yet elapsed to establish the permanency of cure in many of the brilliantly successful cases; nor have there been many opportunities to examine the changes produced in the tissues, beyond those produced experimentally on animals in the laboratory. The method promises much in the future, and certainly is a valuable aid to our surgical technique.

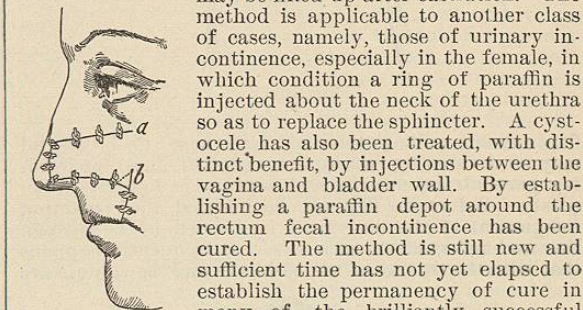


FIG. 4023.

Joseph Ransohoff.

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- 2 Celsus: Lib. vii., cap. ix.
- 3 Gurdon Buck: Repar. Surg., p. 11, 1876.
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- 5 Szymanowsky: Oper. on the Surface of the Body, Kiev, 1865. In Russian only.
- 6 König: Lehrb. der Chir., Bd. I, Arch. f. klin. Chir., vol. xxiii., p. 223.
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- 13 Gersuny: Centralblatt f. Gynäkologie, 1900, No. 48.
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**REPRODUCTION.**—The various processes by which new organisms are produced are included in the general term, *reproduction*.

It was thought by the ancients that many organisms of complicated structure, such as worms, insects, plants, etc., could be formed from mud, decaying material, and other dead matter by a process of spontaneous generation, or *abiogenesis*. It was proved by Redi in 1688 that *abiogenesis* does not occur in insects, but it remained for Pasteur and his colleagues in the latter half of the nineteenth century to show that even the minute and simply



FIG. 4022.

organized bacteria are always produced by division of the living substance of pre-existing individuals of the same species; that is, reproduction in the present condition of the world is always a process of *biogenesis*. Not only is every organism produced by a pre-existing organism, but every cell arises by division of a pre-existing cell, and every nucleus by division of a pre-existing nucleus. (See *Cell*.) Moreover, there is good evidence for the belief that the minute but apparently important elements of the nucleus, known as *chromosomes* (*q. v.*), are also produced only by division of pre-existing chromosomes. So reproduction, like all other vital functions in health and disease, must be regarded as essentially a cellular phenomenon.

Reproduction may be either sexual or asexual. The essential feature of *sexual* reproduction is the development of an embryo from a *fertilized* egg, that is, a germ produced by the union of an *ovum* and a *spermatozoon*, or their equivalents (see articles *Ovum*, *Spermatozoon*, and *Impregnation*). The capacity to produce one or the other of the reproductive elements, together with the associated peculiarities, constitutes the quality of *sex* (*q. v.*). Both of the reproductive elements are cells derived from apparently indifferent germ cells by an interesting process of development, which is discussed under the heading *Reduction-Division*. This process takes place in certain special organs, for which the general name is *gonad*, the female gonad being called the *ovary* and the male gonad, the *testis*. When the eggs or spermatozoa are ripe they are discharged from the gonad, and fertilization may take place outside of the body, as in most fishes, or within the oviduct (Fallopian tube, uterus, etc.), as in man. In man and other mammals the discharge of the ova is associated with certain peculiar physiological phenomena described in the article on *Menstruation*.

Fertilization having taken place, the egg proceeds to divide by the usual process of cell division, and by repeated divisions forms a mass of cells which becomes the embryo. The details of this process vary in different animals, as will be seen by reference to the article on the *Segmentation of the Ovum*. Sooner or later the cells of the embryo begin to differ among themselves in accordance with their destiny in the formation of organs. The causes of these changes are discussed under the title *Differentiation*, and the development of the embryo in form and structure is described in detail in the articles *Fetus* (in THE APPENDIX), *Area Embryonalis*, etc.

Both during development and in the adult condition there is a noticeable similarity between parent and offspring at corresponding stages. This is a fact of great importance, and is fully treated in another place (see articles *Heredity* and *Reversion*).

When reproduction takes place by some method without the aid of a fertilized egg, it is said to be *asexual*. In the bacteria and some of the lower animals the reproducing individual divides into two or more nearly equal parts. This is called *fission* (*q. v.*). In the yeasts, the higher plants, and some animals, a small part of the parent grows more rapidly and becomes differentiated into a new individual. This is *budding* (*q. v.*). A third form of reproduction occurring normally in some species is known as *parthenogenesis* (*q. v.*), which may be regarded either as an asexual or as a degenerate sexual process. In such cases the offspring is produced by the development of an egg without fertilization. Robert Payne Bigelow.

**RESALDOL** is a light-brown powder prepared by the action of chloromethyl-salicyl on resorcin by means of acetylation. It is insoluble in water, ether, chloroform, benzol, and acids, and soluble in alcohol, acetic ether, and alkalis. Its taste is insipid and astringent. On account of its insolubility in acid media it causes no derangement of the stomach (Hermann), but in the intestines sets free the diresoreyl radical and acts as an astringent and antiseptic. Hermann recommends it in acute and chronic diarrhoea, colitis, the early diarrhoea of typhoid fever, intestinal putrefaction, and infantile diarrhoea, and he finds it useless in nervous diarrhoea or that due to mechanical

irritation. Brochocki employed it in twelve cases of tuberculous enteritis, four of acute gastro-enteritis, three of catarrhal dysentery, and three of typhoid. All except the typhoid cases improved, though xeroform, bismuth, and opium had failed. The dose is 1-1.5 gm. (gr. xv.-xxiv.) three times a day. W. A. Bastedo.

**RESECTION OF THE JOINTS.**—The history of this operation dates from the year 1783, when Henry Park formally proposed the operation for the removal of disease. In 1786 Moreau first performed it, and became its staunch advocate as a method of treatment. Little was done, however, until Syms in 1831 in the elbow, and Ferguson in the hip, knee, and wrist, made use of this operation as a conservative method of treatment ("Excision of Joints," R. M. Hodges, Boston, 1861). Since this time this method of treatment has been wonderfully advanced and has been adopted by the ablest surgeons.

A resection is the removal of a portion of the skeleton without great sacrifice of the soft parts. Applied to joints it has for its object the more or less complete removal of the bones forming the joint, the preservation of the sensibility, contractility, and vitality of the soft parts influencing the joint, and the ultimate restoration of motion or the production of ankylosis.

When motion is desired—the ideal object of articular resections—the ends of the bones left in contact must be adapted to one another, and so fashioned in shape as to reproduce the joint surfaces removed. The muscles which move the joint must be left undisturbed in their attachment; or, if disturbed, restored so that their functional action is not compromised.

The ligaments and fibrous bands which subsequently develop and unite the bones must be analogous to those present before operation. To obtain this end, all ligaments must be preserved with their bony or periosteal attachments.

To attempt a nearthrosis with a sacrifice of the muscular and ligamentous attachments often results in a useless pseudarthrosis, inferior in every respect to a useful ankylosis.

To obtain mobility with steadiness and strength in action the preservation of the muscular and ligamentous attachments to the periosteum and the continuity of the articular capsule with the periosteum must be made the main object of the operation. Such a method of operating is known as the subperiosteal or subcapsulo-periosteal resection. Its object is motion with strength and steadiness in action.

In case a solid union—ankylosis—is desired, two conditions arise which influence the result. The first is seen when the divided ends of the bones can be brought into apposition and their fusion takes place directly. In this case ankylosis is assured, provided the disease is removed. The second condition exists when the divided ends of the bones cannot be brought into apposition, but are separated by an appreciable distance from one another. The union here takes place principally through the agency of the periosteum, and ankylosis, more or less doubtful and dependent upon the osteogenic power of the periosteum, results. It is in this latter variety that the pseudarthrosis and flail joints occur.

When ankylosis is desired and is reasonably attainable, the preservation of the muscular, ligamentous, and capsular attachments to the periosteum are of secondary importance.

When bone or a bony prominence is separated and replaced *in situ* in order that diseased tissue can be more thoroughly removed, the resection becomes an osteoplastic one.\*

Again, resections are either complete or partial: complete when the component bony surfaces are removed; partial when one or more, but not all the articulating surfaces are removed.

Resections may therefore be partial or complete, par-

\*This term is sometimes used and applied to operations in which bones not normally apposed are brought together after removal of the intervening bone or bones.