left. Care should also be taken so to make the incisions that the tube will rest on the floor of the nose.

The Watson Operation.—This is especially applicable to those cases in which the deviation is marked and low down, so that it is impossible to bring the lower fragment into line. Instead of cutting out an elliptical piece along the horizontal line, as is recommended by some authors, Watson makes a bevelled incision, the edge of the knife being directed upward and toward the opposite side, and carried *through the cartilage but not the mucosa* of the opposite side. The incision is made on the crest of the deviation. If a vertical deviation exists at the same time, a triangular-shaped portion with the apex uppermost may be removed. The upper portion in the horizontal incision is pressed over toward the other side, where it hooks on to the lower and is thus held in place. The projecting base can afterward be removed.

The Gleason Operation.—The field of operation is cocainized and exposed by a self-retaining nasal speculum. A thin saw is introduced along the floor of the septum beneath the deviation. The sawing is continued in a horizontal direction until the blade has penetrated somewhat deeply into the tissues, when the direction is rapidly changed to one nearly vertical. It is of the utmost importance that the blade be now held exactly parallel to the septum in order that the cut shall be around and not through any part of the deviation. The length of the vertical crura is then quickly increased by means of a small bistoury curved on its flat, and the flap is thrust through the hole in the septum by means of the forefinger.

While the finger is still in the nares, it is carried up along the anterior and posterior crura in order to make certain that the edge of the flap has completely cleared them, and the neck of the flap is then sharply bent. It is not necessary to denude the edges that are in contact. The pressure results in necrosis (at least of the superficial epithelial layer) of the mucosa, after which the parts unite. The special claim made for this operation is that it destroys the resiliency of the flap (a condition of success in any operation) at its neck. It is at this point, and practically at this alone, that resiliency is active—*i.e.*, at the neck of a comparatively long, narrow flap—and hence has a powerful leverage to overcome before it can thrust the inferior edge of the flap back through the septum. The neck should be bent to nearly a right angle.

The Pin Operation.—This operation, devised by Roberts, is performed by making an incision through the most prominent portion of the convexity, breaking up the resiliency with a stellate punch, and introducing a steel pin through the more open nostril, thrusting its point through the anterior part of the septum, forcing the curved portion of the latter into proper position, and then burying the point of the pin in the posterior part of the septum on the previously occluded side. The head of the pin should be covered with some smooth material to prevent irritation of the columella.

Ingals' Operation.—In cases in which the cartilage is bent almost at right angles across the nostrils, Ingals dissects up the mucosa, removes a triangular piece of cartilage of sufficient size, incises the latter farther back at its upper or lower part to destroy its resiliency, and maintains the septum in place by a plug in the occluded naris.

Roe's Operation.—Roe has devised an operation applicable to either bony or cartilaginous deviations. He insists upon the necessity, even if the deviation be confined to the cartilage alone, of fracturing the bone at or adjacent to the attachment of the cartilage. The change in direction of the latter attachment tends to hold the cartilage in its new position. Roe's operation requires a special fenestrated forceps, one blade of which is an ovate ring while the other—long, narrow, and rounded—fits loosely into it, so as not to injure the septum. The length of the handle prevents compression of the anterior portions of the septum. The male blade is introduced on the convex, and the female blade on the concave side of the deviation. The closure of the blades crowds the deflected portion of the septum into and partly through the opening, indenting and fracturing it without affecting the surrounding area. The septum is held in its new position by a plug of metal wrapped with sterilized cotton or gauze. It is placed on the originally convex side and fills the naris.

Moure's Operation.—Moure, of Bordeaux, has devised an operation which he regards as an improvement on that of Asch. Spurs and thickenings are first removed with a special instrument consisting of an elongated ring with cutting edges on its elliptical extremity. These blades are concave externally and convex on the opposite side. Bleeding is checked by the cautery. Luxations of the antero-inferior part of the septum are resected with a knife, the mucosa being sutured. After full healing has occurred, the septum is attacked. Under cocaine an incision, 2 or 3 cm. long, is made close to and parallel with the nasal floor, special scissors resembling those of Asch being employed for the purpose. A second incision is then made at an acute angle to the first and near the front of the nose. There results a movable fragment held in front by the anterior part of the base of the septum, which has been left untouched toward the tip of the nose, and behind by the perpendicular plate of the ethmoid and the vomer. The next step consists in the introduction, on the side of the deviation, of a tubular dilator formed out of the parallel blades, the outer one being rigid and the inner one malleable. The inner one is modelled to the septum by forceps introduced with a dilator. The dilator is left *in situ* for eight days, the parts being kept meanwhile scrupulously clean.

All these operations have been variously modified by surgeons according to the requirements of individual cases. The main points to bear in mind are: (1) To remove all excess of tissue before attempting to straighten the septum; (2) to weaken the support of the latter by incision, fracture, etc., making sure to destroy the resiliency of the parts so that the septum will remain in its new position; and (3) to hold it there by some form of splint until healing has occurred in the new position. Scrupulous post-operative care, frequent changing of the plugs or splints, etc., so as to avoid retention of nasal secretions, are very important factors in the attainment of a successful result. *James E. Newcomb.*

NASAL CAVITIES, DISEASES OF: FOREIGN BODIES. See *Air Passages, etc.*

NASAL CAVITIES, DISEASES OF: GLANDERS.—(Synonyms: Malleus, Farcy, Equinia.) Glanders is a contagious disease contracted from the horse and characterized by the formation of nodules, which soon become pustular and ulcerated, with symptoms of septicæmia and thick muco-purulent or sanious offensive discharge from the nose. It would not deserve space in this place were it not that from its rarity we are especially in need of an accurate account of its symptoms and signs, because personal experience is generally wanting. Although the disease is generally contracted from the horse, it must be understood that it also affects mules, donkeys, goats, cats, dogs, sheep, and pigs.

Anatomical and Pathological Characteristics.—In men the disease is characterized by irregular and sometimes very extensive ulcers in the nose, especially if it has been of long duration. As the ulcers expose the cartilage and bone, these tissues become necrosed, and thus the entire septum and hard palate may be destroyed. Ulceration sometimes extends to the frontal sinus, pharynx, larynx, trachea, and bronchi. Œdema of the larynx may result from the inflammatory changes. Microscopically, the tubercle or nodule of glanders differs from that of tuberculosis, in that it is vascular, has no giant cells, and breaks down by suppuration instead of undergoing cheesy degeneration. At the autopsy conditions are generally found which closely resemble those of pyæmia.

Etiology.—The affection is contracted from the horse or other animals and is caused by the bacillus mallei.

Symptomatology.—The disease may be either acute or

chronic. The chronic affection runs from four to eight months, but the acute generally terminates within three weeks. The stage of incubation is from three to five days. After this period an inflammatory reaction takes place at the site of inoculation, which may be progressive and lead to abscess formation or may retrograde. Later, there are symptoms of general infection, malaise, headache, pains in the joints and muscles, and high fever, often attended by an erysipelatous rash of the nose and throat, which is soon followed by vesicles that burst and discharge a thin serous fluid. The disease may affect various parts of the body, but its most marked manifestations are in the nose and throat. The discharge from these parts is always extremely offensive and usually thin and profuse at first, but later thick and glutinous and sometimes streaked with blood. The voice commonly becomes husky or it may be lost, and cough and dyspnœa may develop. The chronic form is ushered in by a chronic nasal discharge, which may be so scanty that it merely forms crusts, or it may be quite profuse and purulent; or as the result of ulceration the discharges may be yellowish, brownish, or bloody. Upon inspection small ulcers are often found situated beneath the crusts, and sometimes characteristic nodules of a whitish color are seen seated upon an inflamed mucosa. These nodules soon break down in the centre, making small ulcers which may extend and coalesce with others. In man the nodules are much less common than in the horse, and indeed they may be entirely wanting. As ulceration progresses, necrosis of bone and cartilage occurs, and the septum may be perforated. As the disease extends backward, ulcers and inflammatory infiltration appear on the posterior pharyngeal wall, in the mouth, and on the tongue. When the larynx is reached the voice becomes hoarse and breathing may be difficult. In the lungs glanders produces symptoms of bronchitis. The intestinal canal may also be invaded, as indicated by gastric disturbances with diarrhœa, and the disease also attacks the skin, causing multiple abscesses or ulcers.

Diagnosis.—Glanders is to be distinguished from nasal syphilis and tuberculosis. Nasal tuberculosis is usually associated with tuberculosis at the apex of one lung; it is commonly much slower in its progress than glanders, and it cannot be traced to contact with the horse. Finding of the pathogenic bacilli in either case will make the diagnosis certain.

Syphilis frequently resembles glanders, but the constitutional symptoms are much less pronounced. The history is very different and the bacillus mallei cannot be detected in this disease. Notwithstanding this, however, most cases of glanders are ineffectually treated for syphilis for some time before the real nature of the ailment is discovered. The chronic disease may last for weeks or months, and whenever an obstinate nasal catarrh exists in people who are much occupied with horses, a careful examination for glanders must be made. If nodules and ulcers appear, together with abscesses and ulcerations of the skin, in stablemen and others having much to do with horses, the existence of glanders should be suspected and the pus carefully searched for the bacilli. In order to confirm the diagnosis it may be even necessary to inoculate a male guinea-pig, in which case the characteristic nodes appear in the testicles after three or four days. The inoculations are made into the peritoneal cavity.

Prognosis.—The chronic disease runs its course in from four to eight months and terminates fatally in at least ninety-five per cent. of the cases. The acute affection often is superadded to the chronic disease, and when this occurs death invariably results in from six to eight days, but primary acute disease usually lasts for about three weeks. As the disease progresses, the patient passes into a typhoid condition which, in the acute form, soon terminates in coma and death.

Treatment.—Prophylaxis is of the greatest importance, and those working about horses should be able to recognize the disease promptly, but the insidious course of chronic glanders in the horse may make the diagnosis very difficult for a long time. In all such instances the services of a veterinarian should be employed. Little can be hoped for from the treatment of the disease, but locally strong solutions of creosote, tincture of iodine, nitrate of silver, and carbolic acid have been recommended, and it is claimed that recovery has in some cases followed the use of mercurial ointment. General supporting remedies are of course indicated. The secretions and discharge coming from the nose of a patient suffering from glanders should be carefully disinfected.
E. Fletcher Ingals.

NASAL CAVITIES, DISEASES OF: HEMORRHAGE.—The term epistaxis is applied to bleeding from the nasal cavities and adjacent sinuses. Owing to the unusual vascularity of the nasal region, the delicacy of its construction, and its liability to accident, nosebleed is of very common occurrence.

Etiology.—It may be due to traumatisms; to local affections of the nasal cavities, such as hyperæmia, dilatation of superficial blood-vessels, superficial erosions of the mucous membrane, ulceration; to the presence of foreign bodies or of pharyngeal adenoids; to various systemic affections such as anæmia, purpura, and scurvy; to diseased conditions of the brain, heart, liver, or kidneys; to typhoid and typhus fever, measles, scarlatina, diphtheria, pneumonia, etc.; it may be vicarious, occurring in women at the menstrual period; or, finally, it may arise from a variety of other causes dependent upon severe excitation of the circulation or irritation of the surface of the nasal mucous membrane.

It may occur as a result of toxic doses of certain drugs which are eliminated through the mucous surface of the upper air passages. It is present in fractures of the skull, especially at the base, and is also found with necrosis or caries of the bony skeleton of the nose. It has been caused in gunners by the severe concussion of heavy firing. It occasionally follows coitus. Sudden transition from a normal into a rarefied atmosphere may cause it. It is not infrequently the precursor of cerebral apoplexy. It is commonly met with in boys at the age of puberty, and in girls it may precede the establishment of the catamenia. It may occur in women during pregnancy and at the menopause. It is common in childhood, less so in middle life, and again more apt to occur with advancing age.

The bleeding may come from one or both nostrils. Originating from the deeper part of one nasal cavity the blood may be deflected into the nasal cavity of the opposite side, and escape outwardly through that nostril or into the pharynx. Dangerous nasal hemorrhage may occur during sleep, the blood being swallowed without attracting the attention of the patient. Serious loss of blood may thus result. The presence of bleeding in such a case would probably be demonstrated by changing the position of the patient and causing him to clear his throat.

Bleeding most frequently originates from the anterior and inferior part of the nasal septum, and when it comes from this locality it is seldom dangerous, although in some rare cases it may be severe and through frequent recurrence it may cause serious anæmia.

The bleeding point may be located in any part of the nasal cavity, or there may be a general oozing, widely diffused over the surface of the membrane, as in hæmophilia, purpura, and the anæmia of children. When coming from the anterior portion of the nares the blood escapes from the nostrils, but when from the deeper parts of the nasal cavities it may pass backward and be swallowed and later vomited, or it may pass into the trachea and be coughed up. The latter accident is not common. When the bleeding is from the upper and anterior part of the nasal cavity the hemorrhage may be serious. This is explained by the close connection between the anterior ethmoidal vessels and the intracranial circulation.

Plethora, especially when accompanied by deficient menstruation, portal congestion, and some forms of Bright's disease, may be relieved by epistaxis.

Hæmatomata of the nasal cavities are more commonly met with on the septum. They are occasionally seen as the result of traumatism. Examination will often determine the location of the bleeding point, which is apt to be found upon some part of the cartilaginous septum. The anterior region of the nose is the most frequent seat of this trouble.

Diagnosis.—In hemorrhage from the anterior nares the nasal cavity, having been carefully cleansed, should be examined by anterior rhinoscopy, and an attempt made to locate the precise spot from which the bleeding takes place. This will generally be found in the region of the septum. Epistaxis must be differentiated from hæmoptysis, from hæmatemesis, and from bleeding from the lower and median pharynx. This may be done by careful examination of the nasal cavities.

Prognosis.—The prognosis is generally good. When, however, the bleeding is dependent upon a general diathesis or some systemic disease it may be very dangerous.

Treatment.—The treatment of epistaxis must depend upon its origin and upon its cause. It is necessary, therefore, to determine as far as possible what these may be. Vicarious bleedings and those which occur at the crises of certain fevers, may, if they are not excessive, be allowed to continue. In conditions of plethora and in vicarious menstruation it should not be unnecessarily checked. Under ordinary circumstances simple means will usually be effective in stopping the flow. These consist in absolute rest and in keeping the head erect and avoiding the common mistake of inclining it forward and downward. If the bleeding is from the anterior part of the nose, pressure of the ala against the septum may check it. The application of cold to the nose or the insufflation of cold water is often effective. When the bleeding point can be found, applications should, if possible, be made directly to it. This should be done by first drying the place with absorbent cotton and then applying to it nitrate of silver, chromic acid, or even the galvanocautery. Astringents, such as alum or tannin, may also be applied. The iron preparations are as a rule worse than useless, and should never be employed. Of late the use of two remedies has been suggested, both of which experience has proved to be of great value. One of these is antipyrin, the other is the extract of suprarenal glands. The antipyrin should be dissolved in water, about ten grains to the ounce. The suprarenal extract should also be used in strong solution. The bleeding cavity having been freed from clots by means of cold water, about half an ounce of one of the above solutions should be insufflated and retained in the nose as long as possible. This should be repeated once or twice unless the bleeding is immediately checked.

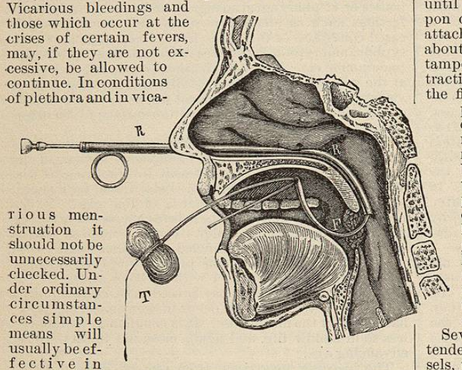

Fig. 3489.—Plugging the Posterior Nares by Means of Bellocq's Sound.

The careful employment of this method is very effective. When simpler means fail, the hemorrhage may be controlled by packing that part of the nasal cavity from which the bleeding comes. For this purpose a sponge should never be used. Far better is it to introduce into the nasal cavity a narrow strip of surgical gauze and then to pack it in carefully against the required spot. If the bleeding point is in the upper part of the cavity, the lower part may be left free to permit of normal respiration. The proximal end of the gauze strip should be left free, so that in the withdrawal of the tampon only so much need be removed at one time as can be readily detached. Forcible removal is certain to cause a recurrence of the bleeding. Great care should therefore be exercised and the plug should be saturated with some solvent solution before any manipulation is applied to it. As a rule the plug should not be retained for more than one day. If it occurs posteriorly the bleeding may be checked by inserting a tampon into the naso-pharynx, and, if necessary, at the same time packing the anterior part of the nasal canal. For packing the naso-pharyngeal region a flexible catheter or a Bellocq's cannula (*R*, in Fig. 3489), to the distal end of which a loop of silk has been fastened, should be passed through the nose and its distal end brought into the pharynx. To the loop a strong ligature should be fastened and drawn upward and then forward until the attached end is outside of the nostril. A tampon of lint or cotton (*T*), saturated with vaseline and attached to the middle of the ligature which should be about eighteen inches long, should be in readiness. The tampon should then be drawn carefully into place by traction upon the string, aided by manipulation with the finger in the pharynx. The tampon having been placed, it is well to make a firm block of absorbent cotton around which the anterior end of the string may be wound and held in the vestibule of the nose. The pharyngeal end of the string should be brought out of the mouth and loosely attached to the patient's ear. To remove the tampon, the best plan, as a rule, is first to cleanse the parts as thoroughly as practicable and then apply to them a solution of suprarenal extract in order to secure the greatest possible contraction of the blood-vessels. Lastly, the parts should be covered with liquid vaseline, and time enough allowed for it to saturate the surface of the tampon as deeply as it can penetrate. Only the gentlest traction should be applied to the string while the tampon is being removed.

Severe bleeding may require the use of revulsives intended to cause reflex contraction of the nasal blood-vessels, the administration of remedies intended to quiet the action of the heart, the application of pressure, externally and internally, and in extreme cases transfusion or some kindred measure. In the most severe and intractable cases of epistaxis the nasal cavity may easily become septic, and thus another serious feature be added to the case.

D. Bryson Delavan.

NASAL CAVITIES, DISEASES OF: LEPROSY.—Leprosy of the nose attends some cases of general leprosy or elephantiasis, and is characterized by a formation of nodular masses and diffuse thickening of the skin of the bridge of the nose, which by being thrown into vertical folds causes the condition known as facies leonina. The nose, especially below the bridge, becomes deformed by the growth around it of nodular masses that enter into the substance of the nasal tip and alæ, changing them into three tumor-like masses that lie side by side, separated by deep fissures. It is also attended by congestion of the mucous membrane with uniform or nodular swelling and considerable deformity and ulceration.

Etiology and Pathology.—This part of the subject has been fully discussed in the article entitled *Leprosy*, and the reader is therefore referred to it for information on the subject.

Symptomatology.—Among the early symptoms are diffuse thickening of the skin over the bridge of the nose. This is at first bright red, but later of a brownish-red and shiny appearance; in a still later stage it becomes paler and of a light grayish-brown, or finally it darkens to a chocolate color. Deep, painful, and bleeding fissures occur between the tumor-like projections at the end of

the nose, ulcerations develop, and cicatrices are formed leading to a great variety of deformities. In time the nose flattens, broadens, and sinks in, the nostrils often being narrowed to mere slits by thickening of the alæ nasi. The appearance of a nose in this condition is likened to that of a hound. This change is due mainly to destruction of the cartilages of the external nose and the cartilaginous septum, and to cicatricial retraction of the external nose. Sticker believes that the initial lesion of leprosy is usually an ulcer above the cartilaginous part of the nasal septum, and it has often been found that the disease attacks some portion of the nasal cavity before there are any external manifestations in other parts of the body. The primary focus may thus be hidden for a long time and the disease may easily be mistaken for other affections of the nose. At first there are obstruction to nasal respiration and a free watery discharge which later becomes purulent and extremely offensive on account of ulceration and necrosis. Severe epistaxis also frequently occurs. After a period of months or years, the discharge gradually ceases and the nares become dry. About this time leprous nodules may appear on the face and external nose. The nasal mucosa, which is at first red, gradually fades and becomes yellowish, grayish, or pure white, due to the hard leprous infiltration. This infiltration may be diffuse at first, or it may form tubercles and tumors, from 5 to 15 mm. in diameter, which spring from the anterior part of the septum and the anterior end of the inferior turbinals. Unless preceded by pharyngeal leprosy the disease first invades the anterior portion of the nares, but as it progresses the cartilaginous or bony septum may be destroyed by ulceration. In this stage the secretions often dry and fill the nares with large hard crusts that can be removed only with considerable force, a procedure which is likely to cause free hemorrhage that may be sufficient to require packing of the cavity. The destructive process may also affect the turbinated bodies. Finally ulceration ceases, cicatrization follows, and the dense scars may obliterate the nasal cavities. As a rule the ulcers and other leprous lesions display characteristic anæsthesia when touched with a probe, and the sense of smell is lost.

Diagnosis.—The diagnosis must depend upon the presence of the peculiar thickened nodular formation, ulceration, cicatricial contraction, and the odor of the secretions, and the finding in them of the bacilli lepræ, which are apt to be abundant. It is often difficult to make an examination of the nares because of the contraction of the nostrils or of the sensitiveness of the formations at the end of the nose. The thick dry crusts may also prevent a satisfactory inspection. The disease can generally be distinguished from tuberculosis by the presence, in the latter, of tuberculous deposits in other parts of the body and by the occurrence of thickening and cicatricial contraction in leprosy. In a few cases syphilitic infiltration may simulate leprous nodules, but the history and the effects of antisyphilitic treatment usually clear up the diagnosis in a short time. Again, the progress of syphilis in the nose is much more rapid than that of leprosy.

Prognosis.—There appears to be no tendency to spontaneous recovery, and unfortunately treatment offers little hope of cure.

Treatment.—Internally the gurjun and the chaulmoogra oils have been highly recommended, the former in doses of five to ten minims, the latter in doses of two drachms, but there is much doubt as to whether either does any good. By way of palliative treatment the dry secretions should be softened by ointments and alkaline or oily sprays. The obstruction of the nares may be relieved partly by severing adhesions or by other surgical measures, and bougies may sometimes be employed to keep the nares free from obstruction. However, care should be used not to cause much bleeding or to give the patient much pain.

E. Fletcher Ingals.

NASAL CAVITIES, DISEASES OF: MUCOUS POLYPI.—Nasal mucous polypi are hyperplastic, œdematous outgrowths originating commonly from the mucous membrane of the parts of the nasal cavity above the lower turbinated bodies. They cause obstruction of the nares and usually free discharge of watery mucus. Mucous polypi occur oftener in men than in women. They are seldom found before the twelfth year.

Anatomical and Pathological Characteristics.—Mucous polypi are generally smooth, glistening, and translucent, and of a grayish-white color, but they may also have a pink or yellowish tinge. Occasionally they are opaque and bright red. Portions of the growth that are exposed to the air in the nasal vestibule are sometimes covered with thick pavement epithelium that has the appearance of white paint. These growths may be sessile or pedunculated, and rarely they are found hanging by a mere thread. According to their surroundings they may be globular, pyriform, or flattened. Many may cluster together, large, small, and minute specimens arising from the same attachment. The number of the growths varies greatly, but they are generally multiple and often fill both nasal fossæ from the nostrils to the posterior nares. Polypi originate most commonly from the lower border and outer surface of the middle turbinated body and from the region of the hiatus semilunaris, though they may also grow from the superior meatus and turbinal. They are very rarely attached to the septum, and so seldom do they arise from the lower turbinal and nasal floor that their origin from these parts is a pathological curiosity. The pathology of these growths is considered elsewhere.

Etiology.—The most frequent cause of the disease is chronic rhinitis with polypoid hypertrophy of the middle turbinated body, a condition which precedes the formation of true polypi. Polypi are occasionally caused by foreign bodies, and often appear to result from chronic suppuration; they are therefore a frequent accompaniment of empyema of the accessory sinuses. They occasionally precede malignant growths originating in the deeper parts of the nasal cavity or in the sinuses. Successive crops of polypi may thus be removed until the carcinoma or sarcoma has made enough progress to become visible.

Symptoms.—Polypi often exist for years before the patient is made aware of their presence by obstruction in the nose. A watery or occasionally purulent discharge from the nostrils is one of the first manifestations of the disease. This symptom is accompanied or soon followed by gradually increasing obstruction in one or both nares. Many patients do not seek relief until the nasal passages become nearly or completely closed. The sensation of a body moving to and fro in the air current is sometimes felt. As the growths increase in size, sensations of fullness and pressure occur in the upper part of the nares, or there may be actual pain that may radiate to the forehead.

Polypi growing from the septum are often vascular and cause severe nosebleed, and rarely the growths in other locations are angiomatous and give rise to the same symptom. In most cases the sense of smell is lost. The catarrhal inflammation is liable to extend to the lachrymal duct and to cause its stoppage with resulting lachrymation, and deafness frequently results from deflation of the middle ear and catarrhal otitis media. The symptoms of polypi are aggravated during damp weather by swelling, while a dry atmosphere improves the patient's condition. The usual results of mouth-breathing, such as injury to the incisor teeth from drying of the enamel, pharyngitis, and laryngitis, follow the disease, which frequently also gives rise to reflex disorders. Prominent among the latter are fits of sneezing, lachrymation, and conjunctival irritation. Asthma is frequently caused by polypi, though not so commonly as reported by some authors. Other reflex phenomena such as nightmare, migraine, headache, giddiness, hay fever, epilepsy, and gastric disorders are occasionally observed, but they often remain unchanged after operation. Inspection usually discloses only the foremost of the growths, but the polypi at the posterior part of the group may often be seen by posterior rhinoscopy. A large polypus may appear as

a translucent spherical tumor resting upon the soft palate, while the pedicle by which it hangs is usually hidden. Smaller growths fill the space between the turbinals and posterior end of the septum, or that between the lower and middle turbinals or between the middle turbinal and the upper border of the choana. In this location the growths are sometimes of almost glassy transparency and difficult to see. In other cases they appear like muco-pus.

Diagnosis.—Polypi have so characteristic an appearance that they are not easily mistaken when seen by anterior or posterior rhinoscopy, and palpated with a probe. In a case of nasal obstruction the nasopharynx should always be examined, as there may be no polypi in the anterior part of the nose while the posterior nares may be occluded by them. The inexperienced might possibly confound septal deflection with a polypus, especially when the convexity of the deformity presents the appearance of a pink or red tumor in the nasal vestibule. The concavity of the deflection in the opposite naris, and the fact that a probe can be passed on only one side of the prominence of the bent septum, while it may pass on both sides of a polypus, should prevent error.

Polypi are distinguished from thickening of the turbinated bodies by their translucence, lighter color, lack of resistance when touched, and their great mobility. When the turbinals are firmly pressed upon with the end of a probe, a characteristic sense of bony resistance and immobility is felt. The swelling of the septum, due to chronic abscess, is of a deeper color than that of a polypus; it is usually much the same in both nares, and it is not possible to pass a probe between it and the septum. Foreign bodies generally cause unilateral offensive purulent discharge, while polypi are commonly attended by bilateral, watery, and odorless secretion. The sensation given to the probe is also quite different. Malignant tumors of the nasal cavity or of one of the sinuses may be hidden from view by polypi created by the irritating effect of their growth, and they then cannot be recognized. Visible malignant growths have a grayish, pinkish, or deep red color and often a sloughing and ulcerated surface. They commonly spring from the septum, a site rarely occupied by polypi, and they usually bleed easily. Pain and rapid growth are characteristics of the malignant neoplasms, and carcinoma generally ulcerates early and gives rise to stench. The hardness and immobility of enchondroma and osteoma make it impossible to mistake these affections for polypi.

Prognosis.—This affection is not dangerous to life, and in the great majority of cases the patient need expect no worse troubles than nasal obstruction and annoying discharge. Deformity of the bones of the face, formerly attributed to mucous polypi, is seldom if ever caused by them, but is a result of the distending effect of fibroid tumors upon the skeleton of the nasal cavity or is due to the destructive and distending advance of malignant disease. In prerhinoscopic days these growths were often confounded with polypi, and hence frog face and other deformities were attributed to the latter. In rare cases vascular polypi produce dangerous epistaxis. Although single polypi are sometimes expelled, spontaneous recovery does not occur; and even after careful removal of the growths there is a notorious tendency to recurrence, so that many patients suffer from the dread of repeated operations. Assurance may be given that polypi do not change into malignant tumors, and patients should not be worried by the statement that they may possibly precede the latter.

Treatment.—Procedures undertaken without the aid of rhinoscopy, such as evulsion with polypus forceps or curettage after laying open the nose externally, inflict needless injury on the patient and are not to be recommended. The most satisfactory method of treatment is removal of the growths with the steel wire snare or écraseur. The one preferred by the author is a modification of one devised by Clarence Blake. The snare is armed with No. 5 steel piano wire, which in practice has been found to answer better than the other sizes. The loop is passed in vertically, its under edge turned beneath the polypus, and then with a backward and forward movement it is worked up as near the pedicle as possible. The loop is now tightened, and, if thought best, the polypus is cut off at once, but usually better results are obtained if it is torn from its base by traction. There is little danger in this way of removing any of the normal tissues, for it is almost impossible to include within the snare anything but the polypus. When polypi grow from broad bases, and are attached over the whole surface of a turbinated body, the bone may be torn off with the snare if much traction be made. Under such circumstances the experienced operator, noticing the increased resistance of the normal tissue, instead of continuing the traction, will tighten the wire loop and cut the growth as near its base as possible. When polypi repeatedly grow from a large surface of the middle turbinal, it is sometimes better to remove the body entirely to prevent recurrence. The operator should have at hand forty or fifty applicators wound with absorbent cotton for swabbing out the blood while the operation proceeds, as it is useless to try to catch the tumors when the nose is filled with blood. Spraying the nasal cavities before operation with a solution of adrenal extract will materially lessen the bleeding. Whatever operation is performed, the parts should first be thoroughly anæsthetized with a four- to ten-per-cent. solution of cocaine, which is best applied by means of a hypodermic syringe fitted with a long, blunt, silver nozzle bent at the end, so that the solution may be thrown up about the base of the tumors. Sometimes both cavities may be cleared at once, but it is usually preferable to remove the growths that can be easily reached, and to complete the operation at one or two subsequent sittings, as this generally gives the patient much less discomfort than one long sitting. After the polypi have been removed, the patient should cleanse the nose once or twice daily with a wash of sodium bicarbonate, a teaspoonful to the pint of lukewarm water. Antisepsis and healing will be promoted by insufflation two or three times daily of a powder containing ten per cent. of boric acid and twenty-five per cent. of iodol, with sugar of milk sufficient to complete the mixture; together with the use of a spray containing about one minim of oil of wintergreen, two minims of carbolic acid, and three minims of oil of cloves to an ounce of Oleum petrolatum album. If the secretion be profuse, ten minims of terebene may be added with advantage. The patient should return in about a week, when it will often be found that polypi which were invisible at the time of operation have descended and may be removed. He should return again in from four to six weeks, so that if the polypi are growing they may be thoroughly destroyed with the galvanocautery.

In some cases mucous polypi do not return after one thorough removal, but usually recurrence takes place and operative procedures must be repeated from time to time until complete destruction of the growths is effected. When empyema of one or more accessory sinuses exists, this must be relieved before the patient can be freed from relapses; and in those instances in which the tumors originate from the region of the hiatus semilunaris or superior meatus it is occasionally necessary to remove the middle turbinated body in order to reach the site from which they grow. In order to get at polypi located behind a deflection or large spur of the septum, it may be necessary first to correct this deformity. In the majority of cases operations upon the nasal skeleton are unnecessary, and careful treatment will eradicate the disease. Polypi in the posterior nares can in most instances be reached by passing the snare through the nostril, but the assistance of a finger in the nasopharynx to adjust the wire may be needed; and in cases in which the polypus is very large, the wire loop may have to be drawn in through the mouth and passed up behind the soft palate by an instrument devised for that purpose, as recommended by the author in the removal of retronasal fibrous tumors.

E. Fletcher Ingals.

NASAL CAVITIES, DISEASES OF: NEUROSES.—I. Neuroses of Olfaction.—The olfactory nerve consists of about twenty fibres given off from the under surface of the olfactory bulb. These fibres pass down through the cribriform plate, dividing into two groups as they enter the nose—an inner group distributed over the upper third of the septum, and an outer group distributed over the superior turbinate bone and the upper half of the middle turbinate bone. In structure it differs from other nerves in being composed of non-medullated fibres. The olfactory centre in the cortex is not definitely known, but is generally associated with the temporal lobe (Gray).

The nerve is liable to disorders in connection with both its point of origin and its distribution.

Parosmia is a perversion of the sense of smell. While the sense of smell may or may not be perfect for ordinary odors, there are in addition certain imaginary odors. This is comparatively common among the insane, and is found in epilepsy, hysteria, and syphilis. It has occurred in connection with the epidemic disease—the grippe, cases having been reported in which the patient was annoyed for days by unpleasant odors and tastes. The writer has observed this condition in connection with atrophic rhinitis when the ordinary sense of smell was destroyed. Here the condition is one of considerable annoyance to the individual. The affection is comparatively rare.

Hyperosmia is an exaggeration or hyperæsthesia of olfaction. In this affection odors which are not ordinarily noticeable to the healthy nose are present as exaggerations, causing great annoyance. The odor of an offending substance is often retained for several hours after the removal of the offending material. Like parosmia, it is comparatively rare. There seems to be some connection between it and certain disorders of the sympathetic nerve. Both parosmia and hyperosmia seem to be dependent more on some general nervous disorder or some neurotic predisposition than upon any disorder of the olfactory nerve within the nose itself.

The *treatment* of both the foregoing affections should be directed to the cause so far as it is possible to ascertain it, as direct treatment of the nerve is not likely to do much good.

Anosmia, or Loss of Smell.—This is by far the most common of the affections of the olfactory nerve, and may have its point of origin within the cranial cavity or within the nose.

Anosmia Intracranialis.—This may be caused by injuries, tumors, degeneration, as in locomotor ataxia, general paralysis, senile decay, intracranial syphilis, congenital absence of the olfactory nerve, hemorrhage, meningitis, and abscess. Cases illustrating these various forms of origin have been reported by several observers. Compared with the total number of cases of anosmia, those of central origin must be considered to be rather rare.

Anosmia Nasalis.—This form of anosmia, in which the pathological condition is of nasal origin, is by far the most common. It may be the result of either acute or chronic processes. For the function of the sense of smell to be properly performed, air, with odoriferous particles, must freely reach the terminal filaments of the nerve, and these are stimulated to activity only when in a moist medium; hence anything that interferes with the free access of air or with the moisture of the part will cause partial or complete loss of the sense of smell. Acute anosmia is usually due to acute processes, like colds in the head, the grippe, acute ethmoiditis, hay fever, or to any condition that temporarily blocks the nose. With the subsidence of the acute condition the sense of smell usually returns.

Owing to the close relationship between the sense of smell and the sense of taste, anosmia is usually accompanied by very pronounced loss of taste, especially of flavors. If the sense of taste is unchanged, the loss of the function of olfaction is only partial.

The chronic forms of anosmia occur in connection with anatomical changes in the nose, such as spurs, pronounced deviation of the septum, or any changes which close the nostril, especially hypertrophic conditions of the middle turbinate. They also accompany the degenerative conditions of the mucous membrane, such as atrophic rhinitis, in which the nasal cavity is abnormally widened, its walls are covered with crusts, and the mucous membrane is dry to such an extent that the sensitiveness of the terminal nerve filaments is lost.

The *symptomatology* and *diagnosis* offer no particular difficulty. In testing the question of loss of smell, acrid, sharp, or pungent substances must not be used, as they produce irritation of the sensitive nerve filaments rather than stimulation of the olfactory nerve.

In the acute affections the *prognosis* is usually good. In the chronic forms, when the disease has lasted for any length of time, degeneration has probably taken place, and the prognosis is not so good. White[1] reports two cases which were entirely cured by treatment of the nasal disease, one after twenty years and another after ten years of complete anosmia. The author has had several cases in which the sense of smell returned after the removal of nasal polypi. In one instance the sense of smell had been lacking for a period of several years. But cases like the one just referred to must be regarded as comparatively rare, as it is the rule that when the sense of smell has been deficient for a long period of time, the possibility of its recovery must generally be considered doubtful; and the correction of the apparent cause in the nose is not always followed by as gratifying results as could be desired.

The *treatment* consists in the adoption of measures which improve the general nervous system and bring the nose and throat into the best possible condition, so that all parts of the olfactory nerve distribution will be accessible to the air. The area of the distribution of the nerve should be stimulated by such agents as friction, the use of iodoglycerin, solutions of the various stimulating oils, as camphor, menthol, eucalyptol; and an attempt should be made to increase the blood supply and the secretion of the part. While the improvement secured will frequently be satisfactory, the writer has many times been disappointed as to results of treatment, and more often than otherwise in those cases of anosmia in which examination of the nose does not show any apparent physical cause for the condition. Several of these have followed attacks of the grippe, and have been only partially relieved, and occasionally not at all, by treatment; nor have all the cases resulted satisfactorily even when intranasal conditions such as polypi, etc., have been found which were apparently sufficient to account for the condition.

II. Reflex Nasal Neuroses.—The connection between some irritation of the nose and sneezing has been known and considered from the time of Hippocrates; while the writings of the early physicians, as Aurelianus, Avicenna, Pechlinus, Salmuth, and Van Helmont, show that they were familiar with various reflexes of probable nasal origin, such as rose cold, cough, headache, and difficult breathing. The influence of powerful and disagreeable odors on the organism was noted by many authors.

In the eighteenth century Gumprecht advanced the theory that irritation of the trigeminus in the nose was transferred to the pneumogastric, producing reflex phenomena in the throat, stomach, heart, and lungs Rega carried this theory still further, and demonstrated or suggested the relationship between the genital tract and the upper air tract; while Wepfer described a large number of cases in which headache, cough, vomiting, vertigo, disturbances of vision, and other nervous symptoms were dependent upon nasal disorders.

One of the first attempts to define this connection between distant organs as a distinct reflex was made by Müller, in his physiology of 1843, when he wrote that irritation of any mucous membrane in the body could give rise to a respiratory reflex. The credit of first calling attention to the nose as a definite point of origin of various reflexes, with practical observations as to the