

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 turbinates and posterior end of the septum, or that between the lower and middle turbinates or between the middle turbinate 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-poly.

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 nares, 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 turbinates 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 pre-rhinoscopic 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 cerasaur. 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 turbinate, 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 anesthetized 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, pro-

nounced 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 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

treatment and cure of the same, probably belongs to Voltolini,² who advanced the proposition that nasal polyps cause asthma reflexly, or else by hindering respiration they change the chemistry of breathing and alter the structure of the lung. His publication in 1871 was soon followed by a host of observations, confirmatory and otherwise, by different authors. Among these was Haenisch,³ who observed that asthmatic paroxysms disappeared after removal of polypi, and reappeared only upon the return of these growths, and B. Fraenkel,⁴ who regarded the asthma from polypi as a reflex cramp of the bronchi produced by irritation of the sensitive nerve fibres, and, in agreement with Schaeffer,⁵ also stated that this irritation could depend upon or be brought about by catarrhal changes in the nasal mucous membrane.

Asthma was the first disease to be regarded as a reflex neurosis, but various other affections were soon placed in the same category, especially various colds in the head—the so-called nervous head colds.

Next came the observations of Hack, who in various publications in 1882, 1883, and 1884,⁶ widened very much the range of reflex nasal neuroses, until there were included migraine, supraorbital and ciliary neuralgias, nightmare, various coughs, vaso-motor disturbances of the vessels of the skin, epilepsy, and secretory neuroses. These were later followed by reports still farther extending the field of reflex nasal trouble. Among these were cases of exophthalmic goitre, diabetes, affections of the larynx, heart and stomach, chorea, dysmenorrhoea, enuresis, and so forth, until a large part of the pathology was said to be dependent upon disorders of the nose.

These publications of Hack's, with their accompanying brilliant results, called the attention of the whole world of medicine to this subject. Considerable opposition to his views was aroused; and he admitted before his death that his theories had been carried too far by many of his followers. In the main, however, they have received general confirmation; the subject of nasal neuroses already has a considerable literature; and these neuroses are frequently seen to play an important part in pathology.

In order to produce a reflex, a sensitive or sensory nerve in connection with a ganglion, and a motor or vaso-motor nerve fibre are necessary. The chain, of which the ganglion is the centre, being present, the point of origin of the reflex can be at either extremity. All the conditions necessary for the production of reflexes are found in their highest development in the nose; since the nerves supplying the nasal mucous membrane are sensitive nerves, originating near the floor of the fourth ventricle and having connections with many ganglia, as the otic, sphenopalatine, Gasserian, ophthalmic, and others, which in turn connect with motor and vaso-motor fibres and with many sensitive areas in the respiratory tract by means of the pneumogastric and spinal accessory nerves. Connected with these is the sensory nerve of the nose, the olfactory, which supplies the upper portion of the nasal cavity over both the septal and turbinal areas.

Pathology.—The nose through its normal physiology is particularly liable to reflex influences; as its whole function of warming, moistening, and filtering the inspired air is controlled by a highly complex nervous mechanism, which anatomically adjusts itself under normal conditions to the varying atmospheric changes. Its power as a protective organ, through the information which it gives of the presence of various odors and poisonous gases, and by alarms such as sneezing, cough and glottis spasm, is also dependent upon a reflex action.

In proportion to the number of cases of nasal trouble, the number of pathological nasal reflexes is probably comparatively small. Their presence in the individual case depends largely upon the nervous make-up of the individual; and they are more apt to be present to a pathological extent whenever there is increased sensitiveness of the general nervous and reflex mechanism of the entire body.

An attempt has been made to find certain so-called reflex points or specially sensitive areas in the nasal mu-

cous membrane, and such have been described by various authors. J. N. Mackenzie⁷ thinks that the posterior portion of the inferior turbinate is the most sensitive area, though he does not claim that this is the only one. That this area is sensitive, and that its irritation will frequently bring about a severe paroxysmal cough is easily determinable in some individuals by passing a Eustachian catheter without previous cocaineization; in many persons quite a paroxysm of coughing will be set up. The author has met with several instances in which it was impossible even under cocaine so to abolish this reflex that the catheter could be used satisfactorily. In one case vomiting was invariably brought about whenever the catheter was used. Other authors have regarded the middle turbinate area as the sensitive one, but Spiess⁸ thinks that the principal point of irritation is the tuberculum septi. A survey of the literature, however, will soon convince one that there is no certain reflex point, but that the entire nasal mucous membrane can be the subject of reflexes in every point of its entire extent, the septum as well as the turbinate area.

Hack theorized that the condition was due to swelling of the erectile tissue through the nervi erigentes, a theory not accepted by others, as the presence of nervi erigentes in the nasal mucous membrane has not been proven.

Anatomically, the nasal mucous membrane is supplied by the first and second branches of the trigeminus as to ordinary sensation, and as to special sense by the olfactory; and impressions are taken not only directly to the brain, but also indirectly, by means of the branches of communication with the various ganglia and the brain, to the entire nervous system—sensitive, motor, sympathetic, and special sense. The nasal or ethmoidal nerve comes from the first branch of the trigeminus, and covers in its distribution the anterior portion of the nose, the septum, the anterior ethmoidal cells, and the frontal sinus. The second branch, the superior maxillary or dental nerve, supplies the floor of the nose and the maxillary antrum; while the posterior part of the nose, the septum, the posterior ethmoidal cells and the sphenoid sinus are supplied from branches of the sphenopalatine ganglion.

Irritation can be carried to the brain through the motor, the vaso-motor, the secretory, or the sensory tracts. Through the brain the olfactory is brought into contact with the entire system, while the trigeminus is in connection with the sphenopalatine, otic, and ciliary ganglia, and the point of origin of the latter in the medulla is in communication with all of the motor fibres coming therefrom. It is therefore clear that, under favorable conditions, sensory or sensitive irritation of the nasal nervous elements can be referred to far-removed parts of the body, and the most various symptoms produced.

Etiology and Pathology.—The method of origin of all of the nasal reflexes is the same. The first act is an irritation of the afferent nerve fibres, sensory or sensitive. This is followed by the transmission of this irritation to the ganglion and its appearance as an action, motor or otherwise. The exact way in which all this is brought about is still imperfectly understood. The nerves of the nose have a close relationship to the respiratory centre, aside from the fact that inflammation beginning in the nose frequently passes by direct continuity to the lower respiratory region. Irritation begun in the nose has experimentally brought about closure of the glottis, expiratory tetanus, and stoppage of respiration. The same phenomena are caused by irritation of the vagus. The origin of a number of reflex neuroses of the respiratory organs can be explained on the theory that nasal irritations are carried by way of the ganglia to the respiratory centre, and then pass along fibres of the spinal accessory and vagus or along the spinal nerves. This is seen in the case of glottis cramp, paroxysmal cough, and bronchial asthma.

Many eye affections, such as blepharospasm, strabismus, anomalies of accommodation, asthenopia, and pupil changes, seem sometimes to be dependent upon nose affections. The reflex tract is by way of the motor root of the facial and oculomotor nerves, and irritation along this

tract can cause clonic or tonic action of the muscles. The tear function is affected directly through the lachrymal nerves, branches of which supply the mucous membrane of the nose. On the other hand, Ziem⁹ thinks that the relationship of eye diseases to nose affections is brought about chiefly through the blood and lymph tracts, and only seldom through the nerves.

According to Jurasz, these reflexes can be advantageously divided as to their causative significance into three groups:

First, those reflex neuroses in which the sensible irritation originates in the nose and the resultant reflex appears in an organ outside of the nose; in this class are asthma, cough, bronchitis, epilepsy, eye and general nervous and neuralgic disorders.

Second, reflex neuroses in which the sensible irritation is in the nose, and asserts itself as a reflex within the nose itself; under this head are embraced the various forms of nervous catarrh, vaso-motor rhinitis, hay fever, hydrorrhoea, rose colds, and others.

Third, reflex neuroses that have their sensible irritation in some other organ and are carried reflexly to the nose, producing nervous colds, hyperæmia, swelling of the mucous membrane, nosebleed, erythema, œdema, and other anomalies of the outer nose; contained in this last group are those dependent upon digestive disturbances and the class of affections caused by disorders of the sexual apparatus, to which latter the researches of J. N. Mackenzie, Grayson and others have called attention.

Pathologically, the theory of origin of the first group is one of irritation of the afferent nerves of the nose, which pass over through the ganglion to the efferent vaso-motor nerves; and the final effect is produced by changes in the volume of the blood-vessels.

In the second group we have only to do with vaso-motor and secretory disturbances in the nose itself, the pathway of communication probably passing through one of the near-by ganglia. The primary irritation comes from the trigeminus or olfactory nerve endings, to be transferred to those nerves which effect changes in the volume of the vessels and in the quantity of the secretions. In these cases the brain and spinal centres are not necessarily concerned, but the circle is made complete with the help of the peripheral ganglia, and the reflex curve is often short.

In the third group the theory of origin is not yet satisfactory. The phenomena appear as the result of the sensible irritation of organs far removed, as the skin in case of colds, the alimentary canal, and the genital apparatus, and consist in changes in circulation and secretion in the nose. The sympathetic system is probably the principal medium of communication between the parts involved.

In such a highly complex mechanism as the nervous apparatus, the localization of the irritation is frequently difficult, especially so as the irritation can be at either end of the chain. In the main, those reflexes which have their point of origin in the nose itself, and which are the most common, are due to direct irritation of the parts, which may be produced in a variety of ways—by simple changes in volume, by touching, rubbing, or pressing them, by active hyperæmia, by the direct effect of cold, or by the odor of flowers. When there is complete closure of the nostril, the reflex is less manifest than when there is variation of volume, irritation being caused at one time and not at another.

The severity of the reflex explosion does not necessarily bear much relation to the degree of apparent irritation, as slight irritants frequently cause considerable reflex irritation; in fact, the most marked reflexes seem to be associated with the least manifest pathological changes. Slight ulceration in the nose has been known to cause considerable cough, scraping of the throat, and inability to sing, and has been entirely relieved by cauterizing the spot with nitrate of silver. Such a case has been reported by M. Schmidt, and somewhat similar ones by others. These cases are more likely to occur in those of highly nervous make-up. The excessive irritability

of any single portion of the reflex tract may be due to a local disturbance or may be a partial manifestation of some general neurosis, such as neurasthenia or hysteria.

Heredity does not seem to play any particular part. These cases are more common among the better classes than among the poor, and occur in those of highly nervous organization.

The arthritic diathesis has been regarded by French writers as an important factor, and there are many who regard hay fever as dependent upon this diathesis. While, as regards nasal neuroses in general, the arthritic diathesis may be a predisposing factor, it is certainly not the only one.

These neuroses are rare in children, and are most common between the ages of fifteen and forty. Race has but little influence.

Climate and the season of the year are important factors, and one class of nasal neuroses—hay fever, the term being used here generically—is especially frequent in the summer and autumn seasons. The climatic vagaries of asthma are well known; nearly every asthmatic has his private climate, one asthmatic doing well in a climate in which another does badly, and *vice versa*. The writer has known asthmatic members of the same family, one of whom was relieved by removal to a certain place while another was invariably made worse.

As regards the etiology of asthma, it is probable that many cases are dependent upon a nasal reflex condition, but not all. The pathology and etiology of asthma have not yet been satisfactorily worked out. Want of space will prevent its discussion in any detail here. It seems evident that both local and general factors are concerned in its causation. Asthma is a vaso-motor bronchitis, with—in many cases—a cause or an exciting factor in the nose. Certain it is that the correction of nasal pathological conditions relieves and not infrequently cures the disease.

The nervous area of the interior of the nose is extremely sensitive; and any abnormal nasal condition can set up reflexes. The most common of these pathological causative conditions are chronic hypertrophic catarrh, new growths, deviations and spurs of the septum, synechia, cicatrices, foreign bodies—that is, any condition which causes increased volume and pressure in some part of the nasal mucous membrane; while in atrophic conditions the nervous sensibility is so far diminished that the reflexes themselves are also greatly diminished and reflex neuroses are rare.

Operative procedures frequently bring about reflex disturbances, such as sneezing and cough, and may even be followed by vertigo, laryngeal spasm, or more serious conditions. The use of the galvanocautery snare has been succeeded by exophthalmos and rapid pulse; such a case has been reported by Semon. F. R. Packard¹⁰ has reported a case of transient monocular blindness of the left side following removal of the anterior end of the left middle turbinate with the cold wire snare. The writer has seen acute insanity follow operation on the nasal septum in a boy of ten. It was evidently due to the pressure of the retaining plugs, and on their removal recovery was prompt.

There seems to be some sympathetic relationship between the erectile portions of the generative tract and the other erectile structures of the body. Ungratified sexual excitement, as well as excesses in coitus or unnatural sexual habits have brought about coryza of reflex origin. In type this closely resembles that of hay fever, and in the absence of a history might be mistaken for it.

Grayson¹¹ has reported a case in which turbinal engorgement in an engaged young woman was due to excessive demonstration on the part of the young man to whom she was engaged. This brought about ungratified sexual excitement, which was the cause of the nasal engorgement. He cites another case, the patient being a male, in which excessive sexual indulgence had caused nasal obstruction accompanied by marked hypersecretion, sneezing, and headache. All kinds of treatment, local and general, had been tried, the cause not having been suspected. When this was ascertained and the

habits corrected, the nasal condition promptly got well without further treatment.

Mackenzie¹² gives an account of a somewhat similar case, the patient being a woman, and the cause excessive sexual indulgence on the part of herself and husband. Here the complaint was of asthmatic breathing, with stoppage of the nostrils. Moderation in their marital relations soon brought about a cure.

That there is a physiological connection between the sexual apparatus and the nose is shown by various reciprocal relations between engorgement of the turbinate tissues and menstruation, such engorgement occurring in some women regularly during menstruation. Occasionally in those whose menstruation is irregular there is an engorgement of the nasal erectile tissue corresponding to the regular time of the menstrual epoch. Fliess¹³ made investigations, the results of which seemed to show that painful, profuse, or irregular menstruation may in some instances depend upon an intranasal cause. He cites a number of cases to show that the pain of certain forms of dysmenorrhœa may be temporarily dissipated by the application of cocaine to the nasal mucous membrane, or permanently controlled by cauterization. Such a case is reported in the table of cases appended. Fliess regarded the inferior turbinate and the tuberculum septi as those portions of the nose which have a special relation to dysmenorrhœic pains. Vicarious menstruation sometimes occurs in the nose. In boys around the age of puberty nosebleed of apparently sexual origin has not infrequently occurred.

A case of sneezing following tooth extraction in a fifteen-year-old girl has been recorded.

Hypertrophic rhinitis in connection with digestive disturbances is one of the most common of observations; and many catarrhal cases of this class, even with considerable hypertrophy, frequently get well on the correction of the digestive disturbance. It sometimes happens that complete nasal stenosis will follow a full meal. Whether these cases dependent upon digestive disturbances are true reflex neuroses or only parts of a general congestion which is circulatory in origin, may perhaps be a question; since all of the hypertrophic conditions of sudden onset that are dependent upon digestive disturbances might be brought about through a passive congestion or through a loss of the normal vaso-motor tone.

Symptomatology.—Patients usually complain of the particular condition that troubles them and not of the disease of the nose which is the cause. Asthma, neuralgia, migraine, nervous disturbances of the eye, voice, and heart, epilepsy, muscle cramp, goitre, spasmodic cough, and the like, can appear without any manifest signs of affection in the nose and yet be of nasal origin. Again, complaints of the nose, as narrowing, anomalies of secretion, itching, pressure or pain, may be so mild as hardly to be noticed, or the patient may not complain of the nose at all. Frequently cases of this sort are not correctly diagnosed until they have lasted a long time, and the diagnosis may then be reached only by the method of exclusion.

In the first group the rhinoscopic findings are swelling, hypertrophy, ulceration, new growths, foreign bodies, septal deviations, abnormal adhesions. These are also the principal objective causative factors in the second group, as these two classes are dependent upon the same general reflex mechanism, and differentiate themselves only through symptoms varying in causation and quality.

The neuroses of the second group have been given an enormous number of names. They can all be described under one head, to which Jurasz has given the simple designation of "nervous head colds." The general term "hay fever" includes them all.

Hay Fever.—The symptoms of hay fever come on in paroxysms, and in persons apparently well they last minutes or hours and then disappear. When the patient has been under the influence of a pathological condition for a long time, the attack can last weeks or months, with occasional short breaks. While most frequent in summer or autumn it may also occur at other seasons of the

year. Here there is a direct irritation affecting the sensory or sensitive nerves of the nose. This irritation may be due to an emanation from plants, as in pollen hay cold, hay fever and hay asthma; to the odor of flowers, such as roses, violets, and others; to the cooking of certain foods; to the odor of various aromatic substances; or to the emanations from various living animals. It is well known that now and then attacks of asthma are brought about by riding behind a horse. These are usually personal idiosyncrasies. In 1893 Bishop advanced the theory that the real cause of hay fever was an excess of uric acid in the blood, favored by profuse sweating, and common at the hay-fever period of the year. For the development of the disease specially sensitive nerve centres, hyperæsthesia of the sensitive nerves of the nasal mucous membrane, and the presence of irritating agents are necessary. His theories have been accepted by many.

The condition begins by irritation or itching in the nose, followed by sneezing and the discharge of a copious, clear, serous fluid. These symptoms are of all degrees from mild to severe, and the sneezing may be terrific. Bobone has reported a case of unconsciousness and cyanosis as a result of cramp-like sneezing. Fink¹⁴ thinks the large amount of secretion comes from the accessory cavities, the antrum principally, and that the secretory fibres of the trigemini are the ones affected. The secretion is usually thin, but may be thick; frequently large numbers of handkerchiefs are required. On the other hand, sneezing may be present and the condition be one of hydrorrhœa only; or with occasional attacks of sneezing the patient may complain of hindered respiration, stopped-up nose, reddened eyes, swollen conjunctivæ, abundant tears, intolerance to light, itching in neck, cough of an irritating character, pain in head, migraine, trigeminal neuralgia.

In addition to the above there are frequently a laryngitis and a pharyngitis, with cough and sense of oppression in the chest, difficult respiration, and more or less distinctive asthmatic symptoms. Fever is rare.

On inspection the nose conditions are frequently found to be not in accord with the severity of the symptoms. While marked pathological conditions are sometimes present, there may be only redness and swelling; on the other hand, the mucous membrane often appears pale or even anæmic.

This group of cases appears most frequently in the summer and autumn seasons; and the principal exciting cause seems to be the presence of the pollen of certain plants, as roses, hay, golden rod, ragweed, and others. There has to be an individual susceptibility, but the pollen is apparently the exciting cause. From June to September is, in the United States, the most susceptible period, and from the 10th to the 31st of August the worst time, as the ragweed, the pollen of which is then in bloom, is the most irritating of all the pollens.

In the third group, originating outside of the nose, the symptoms are those of a nervous head cold—swelling of the mucous membrane, stopped-up nose, sneezing, irritation, increased mucous secretion. Vicarious menstruation, abnormal dryness of the mucous membrane of the nose, anosmia, hallucinations of odor, changes of the skin of the nose, redness—all these may be of genital origin. Indigestion may also cause many of the same symptoms.

Diagnosis is not usually difficult in the group in which the whole process is in the nose, but is difficult when the origin is in the nose and the apparent seat of the symptoms is in other organs. Jurasz thinks that inasmuch as nasal neuroses sometimes follow brilliant results of nasal therapy, we have assumed that *post hoc, ergo propter hoc*. The teaching of Hack's went so far in its results that, given any pathological nose condition, it was stated as the cause of any affection present, and the diagnosis was made entirely as a result of the nasal examination. This belief gained such a foothold that it was said at one time that the whole pathology was seen through the nasal speculum, and everything abnormal that could not be defined was considered a nasal reflex.

Whenever we have a reflex neurosis which is not clear

in its origin, or there is the remotest suspicion of one, the nose should be carefully examined, since doubtless many pathological conditions do come from changes in this organ; but, on finding some trouble in the nose, one cannot be exactly certain that the cause of the neurosis is found, as the nasal condition may be only an accompaniment and not a cause. Many people have extreme pathological changes in the nose without any accompanying reflex phenomena. The mere presence of a nose affection in the course of a disorder known to be a reflex neurosis will neither prove nor disprove that the nose is the cause of the reflex neurosis. An attempt should be made experimentally to bring about a reflex irritation of the supposed zone of origin. While this is probably accurate as a diagnostic measure, it is not absolutely certain.

Cocaine is one of the most valuable diagnostic remedies, since if under its influence the reflex disappears it is probable that it is of nasal origin. Weak solutions of adrenalin chloride will act in the same manner.

In doubtful cases treat the nasal condition and await results. If a cure is effected, the probability of the diagnosis being correct is very great.

In neurasthenic patients the moral effect of doing something in the nose may bring about relief and cure, even when the real cause is not in the nose at all; hence it will not do to label every neurosis that improves under intranasal treatment as a reflex nasal neurosis, though of course this is probable.

In the third group it is difficult to make the diagnosis, since it is not easy to demonstrate with exactness that a nose affection is the result of a remote pathological process. Here therapy has only slight diagnostic value.

The prognosis is good after the removal of the cause, but there are apt to be many relapses. If the affection has lasted a long time, as in asthma, secondary trouble, as emphysema, may be the result.

Therapeutics.—The treatment of the nose must be directed to the condition present. In the first group of cases, correct whatever is abnormal in the nose so far as possible, but do not promise too much. While the results are often brilliant, as in cases cited in the table, they may not be. In cases in which pressure is the cause of the reflex, leave the nose as roomy as it is possible to make it. The details of treatment will depend entirely upon the condition present. The moral effect of intranasal surgery is often considerable.

The treatment of hay fever must depend somewhat on the conditions found. Whether the uric-acid theory be correct or not, it is certain that remedies which favor general elimination are of great value, although the writer has not had any specially brilliant results from treatment based upon this theory. He is in the habit of getting the nasal mucous membrane into as good condition as possible before the attack; and during the attack he cauterizes with chromic acid, allows the patient a spray of adrenalin chloride (1 to 16,000) to be used as needed at home, and gives internally a tablet of: Quin. sulph. gr. ss., ammon. chlorid. gr. ss., camphor. gr. ss., opii pulv. gr. $\frac{1}{10}$, ext. acon. gr. $\frac{1}{10}$, ext. bellad. gr. $\frac{1}{10}$; one of these tablets to be taken every two to four hours, with such remedies for the general elimination as seem demanded. While this does not cure, it greatly relieves.

Fink (*l.c.*) thinks the cautery is of no permanent influence, and says he relieves his patients by insufflating raistol into the antrum. As the natural opening of the antrum is very difficult to find even by the experienced rhinologist, and especially difficult when the tissues are swollen, this method of treatment can have but limited application.

Adrenalin chloride, the active principle of suprarenal gland, is at present a much-vaunted specific for hay fever. That it causes the mucous membrane to shrink and produces immediate relief at the time it is used, and that it is the most powerful devascularizing agent for the mucous membrane yet discovered, are undoubted facts. Its effects are more positive and last longer than those of cocaine, which was formerly used for temporary relief in hay fever.

In the writer's experience with powdered suprarenal extract he did not find that its effects were lasting. It produced immediate relief, but there was a stage of reaction in which the condition was about as uncomfortable as before; indeed, any agent of so powerful a constricting nature would seem of necessity to be followed by a reactionary stage in which dilatation takes place; this has been the experience of several who have used the adrenalin chloride. On the other hand, it must be admitted that many practitioners are apparently having good success in the treatment of hay fever at the time of the attack, with a 1 to 5,000 solution of adrenalin chloride used as a spray two or three times daily. Whether it has any permanent value it is too soon to state. Inasmuch as it produces temporary relief at the time of the attack, it is a valuable adjunct to the therapeutics of the disease. Used in connection with the previous correction of any nasal difficulty, the sufferer from hay fever may be enabled to go through the attack with only slight discomfort.

In regard to the strength of the solution to be given, it seems to the writer as though the weakest solution that will produce the desired effect should be used, even though it is stated that there is no danger of acquiring the habit. As stated above, he has found a solution so weak as 1 to 16,000, to answer very well. The diluting solution may be either decinormal salt solution or some weak alkaline nasal spray solution. The 1 to 1,000 solution of adrenalin chloride is used as the base for dilution. Adrenalin solutions are probably not very stable, and if used for some time should be frequently renewed. Whenever the remedy is ordered for the patient's use, weak solutions should be given, never stronger than 1 to 10,000, the stronger solutions being administered by the physician himself in the form of spray, or applied on cotton pledgets directly to the swollen mucous membrane.

In addition to the local use of adrenalin in hay fever, the extract of the suprarenal gland is administered internally, in doses of from five to ten grains at frequent intervals, until the nasal mucous membrane shows that the vaso-motor paralysis is under control, when the dose is diminished or the intervals between the doses increased so that from fifteen to twenty grains are given per day. Should giddiness or palpitation appear, the dose is to be diminished. Five to ten grains three or four times a day may also be given for one or two weeks before the expected time of attack. The internal administration is to be kept up during the hay-fever season. The adrenalin chloride, 1 to 1,000 solution, in doses of five to thirty drops, may be used instead of the extract of the gland.

Adrenalin has also been administered by instillation into the eyes, reaching the nose through the tear passage. It may also be given hypodermatically.

Curtis¹⁵ has proposed to obtain immunization by administering the fluid extract of the plant, the pollen of which acts as the exciting cause, and he has had some success with ragweed.

In all conditions of nasal neurosis, in addition to the local measures, treatment should be directed to the general system so as to lessen the nervous irritability.

The bibliography of this subject is so extensive that space cannot be given to it here. The reader desiring to study the subject in detail is referred to the extensive bibliography given in the article by J. N. Mackenzie on the same subject in the previous edition of this Handbook; to the article by Dr. Mackenzie on the relations between the nose and sexual apparatus, already referred to; to the article on nasal neuroses in Burnett's "System of the Diseases of the Nose and Throat," by Joseph A. White; and to the very extensive and comprehensive bibliography in the article on nasal neuroses in Heymann's "Handbuch der Laryngologie," by Jurasz, to which article the author desires to express his special obligations in the preparation of the foregoing.

The following table gives a number of examples of the various reflexes considered, with the detailed treatment and the results. These cases are mostly unpublished,