cheapness. On the other hand, as compared with amyl nitrite, the sodic salt is slower in establishing its effects, so that when urgency of relief is demanded the amylic salt is preferable. Sodium nitrite gives rise to some disagreeable eructations of gas, but in therapeutic dosage the occurrence is slight. The *dose* of sodium nitrite should, for a pure sample, not exceed 0.13 gm. (gr. ij.), for the larger doses of five, ten, and twenty grains that were at first used by investigators have, with good specimens of the salt, produced very distressing and even alarming effects. The effects of a two-grain dose will persist a number of hours. Care should be taken in prescribing this medicine that the sample is of good quality and not too old. *Edward Curtis.*

[1] American Journal of the Med. Sciences, July, 1880.

NITROBENZENE, POISONING BY.—This substance, also called nitrobenzol, is made by the action of nitric acid on benzene (benzol), which is one of the ingredients of coal tar. The formula of nitrobenzene is $C_6H_5NO_2$; it is a substitution product of benzene. It is a clear, straw-yellow liquid, insoluble in water, and possessing a strong odor, sufficiently like that of bitter almonds to permit of its use in perfumery and confectionery. It has become a rather familiar article of commerce under the name of oil of myrbane. It appears from several recorded cases that small doses of the liquid are poisonous, and even its vapor is active. The symptoms resemble somewhat those of prussic acid, but there are no immediate insensibility and no convulsions. The skin becomes clammy, the lips and fingers purple, the eyes glassy, and the breathing very slow and infrequent. In a case that occurred in the practice of Dr. H. M. Dean, of Muscatine, Iowa (*Medical Bulletin*, vol. i., p. 50), violent effects followed the mere tasting the article. The pulse was not much affected, but the respirations occurred at long intervals. The mind usually remains clear for some time, but unconsciousness ultimately ensues. The diagnosis will generally be determined by the powerful and characteristic odor of the substance, which can easily be distinguished from that of both prussic acid and oil of bitter almonds, which it most nearly resembles.

Nitrobenzene is partly converted in the body into aniline, but its poisonous action does not depend on this conversion.

There is no specific treatment; the symptoms must be combated as they arise. Free washing out of the stomach with lukewarm water has been found to be of great advantage in many cases of poisoning, and would be applicable here. Dr. Dean, in the case above referred to, used fluid extract of digitalis, one drop every hour, and also, every few minutes, a teaspoonful of a mixture of one part of alcohol and two of hot water. He could make the patient swallow by putting the spoon well back on the tongue. *Henry Leffmann.*

NITROGEN MONOXIDE.—Nitrogen monoxide (N_2O) is the body commonly called *nitrous oxide gas*, and formerly popularly known as *laughing gas*. It is a colorless gas, practically without smell, and with a very faintly sweetish taste. It dissolves in a little more than its own measure of cold water, to a less extent in warm water, and to a less extent still in a saturated aqueous solution of sodium chloride. By combined exercise of cold and pressure the gas can be condensed to the liquid condition, yielding a colorless and very mobile fluid. Upon release of pressure this fluid immediately springs again into the state of gas. Nitrogen monoxide actively supports the combustion of inflammable bodies, undergoing decomposition and yielding up its oxygen to the burning substance.

Nitrogen monoxide is, physiologically, absolutely bland, and being also odorless is perfectly respirable even when substituted, pure, for atmospheric air. When so respired, the gas, from its free solubility in watery fluids, is rapidly absorbed into the blood. If inhaled with admixture of enough atmospheric air for the ordinary needs of the system, nitrogen monoxide proves peculiarly exhilarant. A sort of tingling thrill runs through the nerves down to the very finger ends, and, if enough of the gas be taken, the experimenter is irresistibly driven to the commission of some extravagant and silly act, almost always such as betokens an uncontrollably joyous state of mind. Singing, shouting, laughing, dancing, and capering are thus the common expressions of the exhilaration—manifestations whence comes aptly the old name *laughing gas*, applied to a mixture of nitrogen monoxide and air. When inhaled pure, in entire substitution for atmospheric air, there is, first, a very transient exhilaration, and then rapidly follow the same phenomena as when pure nitrogen is respired, namely, such as result from the respiration of an atmosphere devoid of available oxygen. The blood returning from the lungs ceases to acquire the arterial hue, its free oxygen rapidly diminishes in quantity, the animal speedily loses consciousness, and, if the inhalation be continued, dies by asphyxia, in the same time that it dies in an atmosphere of plain nitrogen, and with a similar reduction of the percentage of free oxygen contained in the blood. These various facts sufficiently prove that at the temperature of the animal body nitrogen monoxide resists decomposition, so that the oxygen of its molecule is unavailable for the purposes to which ordinarily respired oxygen is put.

Nitrogen monoxide inhaled pure is, then, practically an agent that will, without other derangement, produce the unconsciousness of coma from asphyxia, while not interfering with the free play of the lungs in the respiratory act. The clinical phenomena of the inhalation are, *subjectively*, a beginning feeling of the peculiar tingling and sense of exhilaration noted above, which, however, is soon overwhelmed in swift-rushing unconsciousness. According to the fulness of the respirations the unconsciousness may supervene in from a few seconds to two or three minutes. In a carefully observed experiment the writer of this, practising the fullest possible forced inspiration and expiration, and beginning the inhaling after a forced expiration, was noted to have passed into complete unconsciousness in the middle of the third inspiration. During the continuance of the unconsciousness anæsthesia is absolute; and upon withdrawal of the gas and substitution of atmospheric air the senses are regained as rapidly as they were lost, and in two or three minutes the experimenter is in perfectly normal physiological status again. *Objectively* the phenomena are a swiftly developed lividity of the skin and mucous membranes, staring, and sometimes convulsively rolling eyeballs, a convulsive twitching of the hands, and, when unconsciousness has supervened, a slow, snoring respiration. The pulse is little affected. During the unconsciousness the muscles, with the exceptions noted above, are quite thoroughly relaxed.

Nitrogen monoxide is used as a medicine proper and as an "anæsthetic." Taken in small quantities, so as not to interfere with normal absorption of oxygen, the substance often seems to abate symptoms of nervous debility or exhaustion, and hence to be of value in the treatment of many so-called functional nervous diseases. For such purposes the gas may be given by inhalation, a few whiffs being drawn from a bag through the usual mouthpiece, while at the same time atmospheric air is breathed through the nostrils, purposely left unclosed. Another method of administration is to give an aqueous solution of the gas by swallowing. A patented solution of such character, made under a pressure of five atmospheres, has been used under the title of *oxygenous aërated water*. Nitrous oxide water has but little odor, and is slightly sweetish to the taste. But by far the commonest use of nitrogen monoxide is the administration of the pure gas by inhalation, in order to produce the anæsthesia of unconsciousness. For this administration a bag of a capacity of from four to thirty-two litres (one to eight gallons), according to the proposed duration of the inhalation, is charged with a pure article of the gas, undiluted. From the bag the gas is drawn through a connecting tube out of a mouthpiece so constructed that by an arrangement of valves the products of expiration pass into the air and not back into the bag, and also that the operator may, by the turn of a switch, admit air and cut off gas at pleasure. The patient's clothing being so adjusted as to offer no impediment to respiration, the mouthpiece is put in place, the nostrils are gently compressed by the fingers of the administrator, the stopcock that controls the delivery of the gas from the bag is turned, and the patient is enjoined to breathe as fully as possible. As soon as full lividity of the face and stertorous breathing proclaim the development of unconsciousness, the patient is ready for operation, and if such operation be one of brief duration, like the opening of an abscess or the drawing of a tooth, the administrator at once removes the mouthpiece as soon as unconsciousness is attained, anæsthesia persisting for a number of seconds after withdrawal of the gas. If the operation be a prolonged one, then, as soon as coma is complete, the administrator, by turning the switch in the mouthpiece, gives a little air, and then again, by a reverse turn, a little gas, and so, guided by the color of the blood as seen through the skin, by the snore of the respiration, and by the presence or absence of voluntary muscular movements, he skilfully gives, alternately, air to keep his patient alive and gas to keep him in practically continuous unconsciousness. In this way a practised administrator can maintain prolonged anæsthesia with nitrogen monoxide; but by the very necessities of the case the patient is always just on the verge of awakening to consciousness of pain on the one hand, and to the undesirable sudden movement of a limb on the other. Obviously, therefore, despite its advantages of swiftness and pleasantness of action, nitrogen monoxide is more appropriate, given in the above manner, as an anæsthetic for momentary than for prolonged operations. In order to secure an easy continuance of anæsthesia, Dr. Paul Bert, of Paris, has proposed the method of administering a mixture of nitrogen monoxide and oxygen under increased atmospheric pressure. Under such circumstances the oxygen of the mixture prevents asphyxia, yet the characteristic anæsthetic unconsciousness of nitrogen monoxide supervenes with the usual quickness and kindliness, and can be maintained continually without dangerous or even disagreeable effect. Bert mixes the gases in the proportion of 85 parts of nitrogen monoxide to 15 parts of oxygen, and conducts the administration in a special chamber of compressed air representing a total atmospheric pressure of 93 cm. of mercury. Anæsthesia has thus been maintained safely and pleasantly without break for over an hour, but the large volumes of gas required for such prolonged application and the trouble of providing the compressed-air chamber will probably always interfere seriously with the extension of the method into practice. Many surgeons use nitrogen monoxide as a preliminary to ether, in the administration of the latter as an anæsthetic.

Nitrogen monoxide is obtained from the salt *ammonium nitrate* by heating the same in a retort. At an elevated temperature the salt decomposes, and from its constituents water and nitrogen monoxide form (NH_4, $NO_3 = 2H_2O + N_2O$). The gas is supplied by manufacturers, condensed to a liquid in strong iron cylinders—a convenient method of storage, since in this way a large volume of gas occupies but a small space. From these cylinders the administration bag is filled as occasion demands. It is not wise to attempt to make the gas, unless provided with apparatus constructed for the purpose, since, unless the distillation be done in a certain precise manner, the resulting gas may contain dangerous impurities. A pure article of fused ammonium nitrate is to be used; the heat is to be gradually applied and never allowed to exceed 400° F. and the gas, after passing through a series of wash-bottles, one of which contains a solution of potassa, is to be collected in a gasometer, over warm water, or over an aqueous solution of common salt. *Edward Curtis.*

NITROGLYCERIN.—Nitroglycerin, called also *glonoïn*, is, chemically, a trinitrate of the radical glyceryl, represented by the formula, $C_3H_5(NO_3)_3$, equivalent to the replacing of the three hydrogen atoms of the hydroxyl groups in the molecule of glycerin by the nitro-group NO_3. Nitroglycerin is made by the action of nitric acid upon glycerin, and is a transparent, colorless, dense oily fluid, of about the specific gravity 1.6; slightly soluble in water, but freely soluble in ether or alcohol. It is slightly volatile, inodorous, and of a sweet, pungent, aromatic taste. Upon concussion, as is well known, it explodes with extreme violence. Nitroglycerin itself is not official as a medicine, but the United States Pharmacopœia recognizes a one-per-cent. alcoholic solution of the substance under the title *Spiritus Glonoini*, Spirit of Glonoin. This spirit presents only the physical characteristics of alcohol, in appearance, taste, and smell, and is entirely non-explosive. But if some of it be spilled, so that the alcohol has a chance to evaporate, the nitroglycerin will become concentrated, and a dangerous explosion becomes possible. The spirit should, therefore, be handled with great care. It should be kept in tin cans instead of in glass bottles, and these should be well stoppered and stored in a safe and cool place, away from exposure to light or fire.

The effects of a one-per-cent. solution of nitroglycerin upon the animal system are, in kind, exactly those of the nitrites (see *Nitrites*), with the additional symptom of a severe and obstinate headache. In rapidity of action, nitroglycerin occupies a position between amyl nitrite on the one hand, and the nitrites of the alkali metals on the other. The agent is powerful; a single drop of the one-per-cent. solution taken upon the tongue produces within three or four minutes a transient feeling of cerebral fulness and frontal pain, and a dose of four or five drops quickly determines a full nitrite derangement—flushed face, throbbing arteries, violent and disorderly heart action, hurried respiration, and splitting headache. Over-dosage is extremely dangerous, as shown by a reported case in which, after a dose of two and a half drops of a *five*-per-cent. solution, the typical nitrite effects were quickly succeeded by sickness, faintness, and coma with stertorous breathing. The heart's action became alarmingly weak, but the patient finally recovered.

Nitroglycerin produces thus exactly the effects of a nitrite, and accordingly the inference is that in the career of the compound in the animal economy it suffers change into a nitrite, and as such nitrite exerts its activity. This subject of a possible chemical conversion of nitroglycerin within the system was studied by Matthew Hay (*Practitioner*, June, 1883), who found that nitroglycerin is decomposed by alkalies and alkaline carbonates, with the conversion of two-thirds of its nitric acid into nitrous, which nitrous acid then combines with the alkali to form a nitrite of the same. This reaction, furthermore, Hay was able to produce by treating a one-tenth-per-cent. solution of nitroglycerin in water with freshly drawn defibrinated blood, and digesting the mixture for forty minutes in an oven at a temperature ranging between 104° and 113° F. Such mixture assumed the peculiar chocolate color of nitrite poisoned blood, and by analysis, after an hour's digestion, nearly the whole of the nitroglycerin present was found to have undergone decomposition.

Nitroglycerin thus seems to be, for the pharmacologist and physician, but a nitrite-furnishing compound, whose distinguishing feature is solely the extraordinary intensity of its action, a feature which Hay accounts for by the fact that nitroglycerin is, by the peculiarity of its composition, exempt from the decomposition by the acid of the gastric juice to which nitrites are liable—a decomposition which always renders inert a certain proportion of each dose of a nitrite swallowed as such.

The therapeutic applications of nitroglycerin are those of the nitrites. The remedy has been used with benefit in angina pectoris, asthma, and epilepsy, especially in *petit mal*, and also in the anæmic form of migraine (Hammond), and in nephritis attended with a hard, corded

pulse (Robson). The dose, in an untried subject, should be at first but a single drop of the customary one-per-cent. alcoholic solution, to be repeated every fifteen minutes until four or five drops shall have been taken or relief experienced. In habitual use, as for epileptics, the dose will very likely require gradual increase. At the rate of an additional drop per dose each month so large a dosage as twelve drops three times a day of the one-per-cent. solution has been taken without the production of undue derangement. *Edward Curtis.*

NITROHYDROCHLORIC ACID. — (Aqua Regia.) Under the title *Acidum Nitrohydrochloricum*, Nitrohydrochloric Acid, the United States Pharmacopœia recognizes the product of mixing together 180 measures of nitric acid and 820 of hydrochloric. On making such mixture effervescence occurs and a golden-yellow, fuming fluid results, strongly acid and intensely corrosive—more so than the original acids of its composition—and also possessed of the peculiar properties of smelling of chlorine and of dissolving readily gold-leaf. This fluid is wholly volatilizable by heat. As its smell suggests, nitrohydrochloric acid contains free chlorine, and the fresher the sample of the acid the higher the percentage of chlorine, since by keeping, especially if exposed to light, the chlorine constantly tends to undergo conversion into hydrochloric acid, deriving hydrogen by the decomposition of water. Nitrohydrochloric acid should therefore be made and kept only in small quantities, and these, after all effervescence has subsided, should be put up in glass-stoppered bottles, half filled only, and stored in a cool place, protected from the light. The reaction whereby free chlorine is evolved in a mixture of nitric and hydrochloric acids is now commonly regarded by chemists as the following:

$$HNO_3 + 3HCl = 2H_2O + NOCl + Cl_2.$$

As already said, nitrohydrochloric acid is intensely corrosive to animal tissues. The acid is possible, therefore, as a surgical caustic, but the more manageable nitric acid is commonly and properly preferred. The special medicinal value of nitrohydrochloric acid lies in the influence of the preparation over the functions of the liver, and also over certain obscure derangements of metabolic processes, notably over that leading to considerable appearance of calcium oxalate in the urine—the condition, in short, clinically dubbed *oxaluria*. As regards influence over the liver, nitrohydrochloric acid has long enjoyed the reputation of tending to abate congestions of the organ, to oppose the march of cirrhosis, and even to favor the limitation of abscess, and, in so-called functional disorders of the liver, to cause recedence of the symptoms. Experimentally, also, Rutherford has shown that the acid possesses considerable cholagogue power. Nitrohydrochloric acid is therefore a standard remedy for the treatment of oxaluria and the various above-named diseases of the liver. The medicine can be introduced into the system either by baths or by swallowing. For a bath the acid should be diluted in the proportion of 8 gm. of the acid to a litre of water (one fluidounce to the gallon), and the bath taken in a *wooden* tub. Such baths should be about blood-warm, and should be administered daily, or twice a week, according to indications. The duration of the bath will range from ten to thirty minutes, or until a tingling or pricking sensation is experienced. After removal from the bath the skin of the bather should be wiped very dry. Instead of a general bath, a foot-bath or a sponging with a dilution of the acid of the strength already given may be substituted. These external applications are undoubtedly efficient, and an occasionally developed salivation proves beyond question the absorption of the acid when administered in this way. For internal giving the dose is a very few drops—from three to five—diluted, at the time of taking only, with a wineglassful or so of water, and the draught sucked through a glass tube, with subsequent thorough rinsing of the mouth. For prescription internally there is also in the United States Pharmacopœia an official preparation entitled *Acidum Nitrohydrochloricum Dilutum*, Diluted Nitrohydrochloric Acid, consisting of freshly made nitrohydrochloric acid diluted, after making, with nearly four times its measure of distilled water. The preparation is a colorless or faintly yellow liquid, odorless, or having a slight odor of chlorine, and a very acid taste and reaction. By heat it is wholly volatilized. This dilute acid is, medicinally, objectionable, because the mere fact of dilution tends to favor the conversion of the free chlorine of nitrohydrochloric acid into hydrochloric acid. As actually dispensed and used, this preparation is, therefore, much more likely to be a mere mixture of nitric and hydrochloric acids than the specific chlorine-containing compound represented by a freshly made sample of the strong acid. The dose of the dilute acid may range as high as twenty drops, to be taken in the same manner as a dose of the strong acid. *Edward Curtis.*

NOBSCOT MOUNTAIN SPRING.—Middlesex County, Massachusetts.

Post-Office.—Framingham.

Access via Northern Division of Old Colony Railroad or Southern Division of Boston and Maine Railroad to station, one and one-half miles distant from the spring.

The spring is located five miles from Framingham, at the base of Nobscot Mountain, the highest point in Middlesex County, and comes through crevices in what appears otherwise to be a solid ledge of rock. The water has a uniform temperature of 41° F., and an average flow, summer and winter, of fourteen thousand gallons per day. The surrounding watershed is a heavily wooded glacial moraine, free from human habitations of any description. Several sanitary analyses have shown the water to be thoroughly pure and wholesome. The following mineral analysis was made in 1891 by Davenport and Williams, of Boston:

One United States Gallon Contains:

Solids.	Grains.
Organic and volatile matter	0.64
Silica	.53
Iron oxide and alumina	.02
Lime carbonate	.75
Magnesium carbonate	.23
Sodium chloride	.36
Sodium carbonate	.38
Potassium sulphate	.30
Total	3.21

There is no hotel on the spring property. The water is shipped in glass packages and supplied to the markets of numerous New England towns and cities. The sales in 1896 amounted to slightly more than six hundred thousand gallons. *James K. Crook.*

NODOSITAS CRINIUM. See *Atrophia Pilorum Propria.*

NODOSITIES, NON-ERYTHEMATOUS, OF ARTHRITIC PATIENTS.—Though known for a long time without any particular attention being paid them, these curious formations have been more specially observed stince Barlow and Warner made a careful study of them a few years back. They were followed by several French observers, more particularly Brocq of Paris, who elaborated them into two varieties—a merely clinical distinction, both forms being made up of round and spindle-shaped cells. They are more common in children than in adults. They may be considered as affording positive evidence of rheumatism, though they do not necessarily appear during the fever but may develop on its decline, or even altogether independently of any acute attack. (Osler.) Often their appearance is coincident with the development of symptoms of pericarditis, sometimes of pleurisy, but especially of severe chronic rheumatic endocartitis.

The first variety, which Brocq calls *ephemeral cutaneous nodosities*, is confined entirely to the forehead, occurring there as ill-defined prominences in and movable with the skin, although they are sometimes adherent to the periosteum. They are entirely painless always, and there is no change of color in the overlying integument. They are never very numerous, rarely more than two or three, sometimes only one, being discovered. They vary in size from a small shot to a pea, and their ephemeral nature constitutes their chief characteristic. Appearing toward the end of the day or during the night (Ferél) without any subjective symptoms whatever, they last but a day at most, and disappear, leaving no traces, to spring forth again, without known cause, in a new place on the forehead.

The second variety (*rheumatic subcutaneous nodules*), by far the more common and better known, differs from the first form in that the tumors are subcutaneous and are more stationary. The overlying integument, unchanged in color, moves freely over them and they strongly resemble syphilitic exostoses or gummata. To the touch they are firm and elastic, freely movable upon the underlying structures. At times, however, this fact may be demonstrable only with attention, when, for instance, the tumors occur over bone, as in the scalp, where they give the impression at first of being exostoses. They are sometimes tender on pressure, seldom spontaneously painful. In size they vary from a pea to a filbert and are sharply defined. Coming in successive crops without premonition they increase slowly, sometimes quite rapidly, in volume to their maximum, remain stationary for a variable length of time—amounting frequently to weeks or months,—then disappear, leaving no trace of their existence. Their favorite locations are the periarticular regions—elbows, knees, wrists, and joints of the fingers. They occur also superficially along the long bones, over the spines of the vertebræ and scapulæ, over the iliac crests, and frequently over the frontal and occipital bones, these last two being particularly favorite sites. The nodules, which as a rule are separate and distinct from one another, although in rare cases they may be confluent, occur at times in large numbers; more particularly in adults.

They are to be distinguished from the swellings of erythema nodosum by the absence of color and from other cutaneous and subcutaneous tumors by their own peculiar evolution.

Treatment should be directed toward the underlying rheumatic diathesis. *Charles Townshend Dade.*

NOMA. See *Mouth, Diseases of*, in The Appendix.

NORTH HAVEN POOL.—New Haven County, Connecticut. The waters of this pool have had a local reputation for more than one hundred years, and it is said that Dr. Trumbull, the historian of Connecticut, was in the habit of accommodating boarders who came to avail themselves of their medicinal effects. According to an analysis by Prof. S. W. Johnson, the following ingredients are found:

Sodium sulphate.	Ferrous carbonate.	
Sodium chloride.	Silicic oxide	
Potassium sulphate.	Alumina	Traces.
Calcium sulphate.	Ammonia	
Calcium carbonate.	Phosphoric acid	
Magnesium carbonate.		

The iron is present in sufficient quantities to give the waters useful tonic properties. They are said to be of decided value in chronic skin affections. The waters are bottled and sold in one-, two-, and four-gallon jugs. *James K. Crook.*

NOSE, INJURIES OF THE.—Injuries of the nose may be caused by firearms or by sharp or blunt instruments. Falls upon the nose and blows with the fist are by far the commonest causes of traumatism. The various lesions which may be produced are: damage to the soft parts, ecchymosis, hemorrhage, emphysema, obstruction to the tear duct, dislocation and fracture, and a variety of deformities resulting therefrom.

The soft parts of the nose, like those of the rest of the face, are abundantly supplied with blood-vessels, and therefore heal readily; hence ragged wounds should be carefully sutured and no tissue cut away even though it is badly lacerated, since its vitality will usually be preserved. Swelling may be limited, if the patient is seen early, by very hot or very cold applications. Later, mild antiseptic lotions, such as a solution of boracic acid, if applied upon a thin layer of gauze so as to facilitate rapid evaporation, will be found most grateful to the patient. At a later stage the wounds may be covered with a dry dressing, such as one of cotton and collodion. Suppuration, on account of the free blood supply, is usually superficial and easily controlled. The skin of the nose is, however, a favorite starting-point for facial erysipelas, for the treatment of which see article on *Erysipelas*. Deeper suppuration should be promptly treated by free incision and drainage on account of the risk of its extending to the cranial cavity.

If the tip of the nose is lost, or the damage to some other portion of it is so great that disfigurement results, a plastic operation will have to be undertaken at a later date to repair the deformity. (See article on *Reparative Surgery.*)

Injuries to the nose, like those to the eye, often give rise to an ecchymosis which is very annoying to the patient. Hot applications and a firm bandage, if applied sufficiently early, may prevent the spread of blood subcutaneously. Later, the discolored skin can be painted so as to be less noticeable. The ecchymosis will begin to fade out in the course of five days or a week.

Hemorrhage from the external parts of the nose is easily controlled. That from the anterior or posterior nares, either with or without accompanying fracture, may be more alarming. It is sometimes kept up by the position of the patient, who, for the sake of convenience, may lean forward over a wash bowl so as to permit the blood to flow out through the anterior nares. Such a position, by producing congestion of the face, tends to keep up the flow of blood. Ice applied to the nose or placed on the back of the neck is sometimes of service in stopping hemorrhage. If the flow of blood is really serious one should not trust to such means, but should attempt to check the blood by pressure directly upon the wounded vessel, or by styptics. Hemorrhage, both that which occurs spontaneously and which has received the name of epistaxis, and that which follows an injury to the nose, usually comes from the septum. If, therefore, the anterior nares be examined by reflected light the bleeding point will usually be discovered. It may be touched with the point of the galvanocautery or with some caustic or astringent preparation, by far the best one being a dilute solution of suprarenal extract which may be applied, after the nostril has been cleansed, either upon a swab of cotton or in the form of a nasal douche or a nasal spray. This remedy is so efficacious that it will rarely be necessary to plug the nostrils with gauze for the purpose of stopping the hemorrhage. When gauze is used, it should be inserted in narrow strips under the guidance of the eye until sufficient pressure is obtained. At the end of from twenty-four to forty-eight hours it should be removed, after thorough moistening, in order to detach it, and the nares should be cleansed by antiseptic irrigation. The old habit of stuffing the nostrils full of sponges or cotton and leaving them undisturbed for several days is absolutely indefensible in view of the modern methods of controlling hemorrhage. (See also article on *Hemorrhage.*)

Emphysema is a complication due to the patient's attempt to cleanse his nostrils by violent blowing. Air is forced through the ruptured mucous membrane and fractured bony framework into the subcutaneous tissue. This complication distorts the visage, but is in no wise a serious one, and the emphysema will speedily disappear of itself as soon as the cause ceases to act. The patient whose nose has been broken should be cautioned against blowing his nose, an act which may also set up hemorrhage and spread infection, as well as cause emphysema.

Obstruction to the tear duct may follow nasal injuries, being usually the result of swelling. It requires no

treatment and will disappear of itself when the swelling subsides.

Fracture and Dislocation.—The solid framework of the nose may be broken or dislocated. It is made up of the vomer and the perpendicular plate of the ethmoid, to which are attached the nasal bones and the quadrilateral cartilage. These structures may be broken in a variety of ways which it is unnecessary to specify, since there are general principles of treatment which should be followed in the case of every fracture or dislocation associated with deformity. Many fractures are compound internally; hence the necessity for perfect cleanliness, to be secured by antiseptic irrigation. Gentle external manipulation will often elicit crepitus and abnormal motion, while examination of the anterior nares will reveal the presence of existing deformity. Such examination is very important, for the future well-being of the patient depends far more upon a free nasal passage than it does upon the correction of external deformity. Internal deformity usually consists of a deviation of the septum so decided as partially to obstruct one or both nostrils. The quadrilateral cartilage may be loosened and rotated upon its articulation with the vomer. A moderate twist of this sort will greatly obstruct both nasal passages. Whatever the deformity, it should be forthwith overcome and the bones kept in a correct position for a few days until they have begun to unite. Instruments for this purpose should be smooth, strong, and not too large. A small periosteal elevator is a suitable instrument with which to raise the depressed bridge of the nose. The septum may be straightened by sequestrum forceps whose blades are protected by short sections of rubber tubing. There are, of course, special instruments for these purposes. It is necessary that the displaced fragments be thoroughly reduced; indeed, over-reduction is generally desirable. When this is accomplished, there is little tendency for a reproduction of the deformity, so that a retaining apparatus is not usually needed. A number of internal and external splints have been devised. Gauze packing carefully applied answers satisfactorily if only one nostril needs to be filled; if the deformity is such that pressure is required in both nostrils, rubber tubes moulded to fit the nostrils are far more comfortable. Various splints have been devised to keep up external pressure upon the nose. The most successful consists of a firm band or plate strapped across the forehead from which by means of a second band or rod pressure can be exerted upon the nose. The direction of the pressure can be regulated by screws or by bending a stiff wire. In some fractures a pin thrust through the nose from side to side will keep the bones in position better than any splints. Such a pin may be withdrawn at the end of four or five days.

Deviation of the septum may also be overcome by two pins passed in the sagittal plane of the body and crossing one another. This is a method of treatment more often used to correct old deformities than fresh ones. (Fig. 3591.)

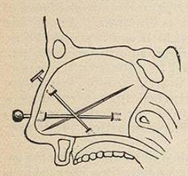

Fig. 3591.—Method of Pinning the Nasal Septum. (Roberts.)

Fracture of the nose is not of itself a serious injury. When the broken bones are replaced they will unite with great rapidity, so that the cure will be complete in from two to four weeks. If the fracture extends upward so as to involve the cribriform plate the patient is exposed to the risk of septic meningitis. Such an injury is really a fracture of the base of the skull, and should be treated as such from the first if the diagnosis can be made. (See article on *Head, Wounds of.*)

Deformity following Injury.—If a fracture or dislocation of the nose is left untreated, or if the surgeon merely pays attention to external appearances and does not correct deviations of the septum, partial obstruction of one or both nares may result. In many cases it is possible to correct such a deformity under a general anæsthetic by forcibly loosening or refracturing the deformed bones with a strong pair of forceps and moulding the nose into the proper shape. Deviations of the septum may require incision or a punching out of certain portions to facilitate complete reduction. (Consult also the article on "*Nasal Cavities, Diseases of: Congenital and Acquired Deformities.*") If the bridge of the nose cannot be lifted, a platinum, or, better, a celluloid support may be inserted underneath the skin and allowed to cicatrize there, thus forming an artificial nasal bridge; which, if it is properly shaped, is not to be told from a natural one. The details of these operations are given in the article on *Reparative Surgery.* *Edward Milton Foote.*

NOSOPHEN — tetra-iodo-phenolphthalein ($C_8H_2I_2OH)_2CO.C_6H_4CO$—is obtained by the action of iodine on phenolphthalein, and is a fine yellowish, odorless, and tasteless powder, insoluble in water and acids, and soluble with difficulty in alcohol, ether, and chloroform. It contains 61.7 per cent. of iodine and may be heated to 220° C. (428° F.) without decomposition. It forms soluble salts with alkalies and insoluble salts with the heavy metals.

Antinosin, the sodium salt of nosophen, is a dark blue amorphous powder, which is freely soluble in water and alcohol.

Eudoxin, the bismuth salt of nosophen, contains 52.9 per cent. of iodine and 14.5 per cent. of bismuth, and is used internally as a gastric and intestinal antiseptic. Dose, 0.2–0.5 gm. (gr. iij.–viij.), or for an infant 0.06 gm. (gr. i.) or less.

Nosophen is a non-irritant iodoform substitute which does not liberate iodine. It is an impalpable powder, of use not only as an antiseptic but also for drying up wound secretions. It forms crusts, however, which must be lifted to allow the escape of the underlying secretions.

Caldwell treats ulcers with nosophen in powder or ten-per-cent. ointment, or with a fifty-per-cent. solution of antinosin. Steele uses three-per-cent. nosophen gauze for the treatment of wounds, abscesses, ulcers, etc., and as intra-uterine packing after curetting. Owing to its freedom from odor, it meets with much favor in nasal cases. E. Klebs uses 0.1-per-cent. solutions of antinosin for mouth and nares, and administers the same solution internally as an antiseptic in dose of 12–24 c.c. (ʒ iij.–vi.). Nosophen has been used in capsule as an intestinal antiseptic, and Millener employed it with success in combination with antinosin in thirty-six cases of chronic suppurative otitis media. The antinosin was instilled into the ear in two- or three-per-cent. solution, and the nosophen dusted into the canal. Antinosin in two-per-cent. solution is also used for bladder irrigations. *W. A. Bastedo.*

NOTIFICATION OF INFECTIOUS DISEASES.—Among the different measures employed by sanitary authorities for the prevention of the spread of infectious diseases, the notification of the occurrence of such diseases now occupies a prominent place. Municipal authorities especially should have the requisite power everywhere to require immediate notice to be given them of every fresh outbreak of diseases dangerous to the public health in order that such authority may take proper measures for the protection of the community.

The chief advantages of a system of notification lie in the possibility which is thus given to a local board of health to determine the extent of prevalence of an epidemic or a localized outbreak, and to inquire into the local causes which have operated to produce it. The board can then act intelligently in applying the proper remedies for preventing its further spread.

Laws enacted with this object in view have been in force in the older States for many years, but not until within the past ten or twenty years have pains been taken to execute such statutes with such degree of efficiency as to make them really protective. The law requiring the householder to report each case of dangerous

disease to the local authority was enacted in Massachusetts in 1792, and that which requires the same duty on the part of the attending physician was enacted in 1827. Little attention, however, had been paid to the enforcement of these laws until toward the end of the 19th century.

Various attempts have been made in England to enact a similar statute, but these efforts were unsuccessful until 1889. By the terms of the law then enacted the notification of infectious diseases to the sanitary authority was made compulsory throughout London, while the principle of local option was applied to all other districts.

During the year in which this bill was under consideration by Parliament, intense opposition had been manifested by many of the members of the medical profession throughout England. Objections were offered not only by the people but also by the medical profession, but the bill passed and finally became a law.

The fallacy of the objections has been abundantly proven by the experience of the towns of England where the Notification Act has been adopted. The notification of each case is made by a certificate furnished by the attending physician, for which a fee of two shillings and sixpence is paid, except in a case in which the person giving the certificate is the medical officer of a public institution, when the fee is one shilling.

The diseases to which this act applies are smallpox, cholera, diphtheria, membranous croup, erysipelas, scarlet fever, typhus, typhoid, and puerperal fever, and any other infectious disease which may be added to this list by the sanitary authority of a district.

In 1899 the provisions of the act had been adopted in cities and towns containing more than twenty-eight millions of inhabitants out of a total of about thirty millions, and in that year, by the enactment of a new statute (62 and 63 Victoria, chap. viii.) the law became compulsory throughout the whole kingdom.

There can be no doubt that the law relative to notification has been productive of excellent results in the prevention of disease, especially in the cities and large towns. It has furnished local boards of health with the necessary information relative to the origin of outbreaks of infectious disease, and in many instances has enabled them to take timely steps for preventing its further spread.

In compiling certain data for the Paris Exposition of 1900 the writer collected the statistics of six registration States and nineteen cities outside of those States, including the ten largest cities of the Union, with the following result. The figures are mainly for the years 1894–98:

Diseases.	Reported cases.	Registered deaths.	Fatality, per cent.
Smallpox	9,222	2,385	25.8
Typhoid fever	69,758	13,284	19.0
Diphtheria and croup	195,783	44,411	22.7
Scarlet fever	127,847	9,211	7.2
Measles	217,755	6,424	2.8
Total	619,765	75,715	....

These results agree fairly well with those of the English local government board for the eight years 1890–97, which showed a fatality for typhoid fever of 18.05 per cent., for diphtheria of 23 per cent., and for scarlet fever of 4.9 per cent.

Another advantage of the practice of notification in recent years consists in the exact data which it furnishes relating to improved methods of treating disease, and the consequent saving of human life. In the thirty-third annual report of the State Board of Health of Massachusetts for 1901 it appears that the notified cases of diphtheria in the pre-antitoxin period, 1891–94, in reporting cities and towns were 13,332, and the deaths in the same places and time were 3,768, making a fatality of 28.3 per cent., while in the following seven years, 1895–1901, after the introduction of antitoxin the cases were 56,459 and the deaths 7,416, a fatality of only 13.1 per cent. The fatality of diphtheria in 1901 was only 10.5 per cent. (see also *Disease, Fatality of*). *Samuel W. Abbott.*

NOTOCHORD.—The notochord (*chorda dorsalis, Wirbelsaite*) is a rod of peculiar tissue, constituting the primitive axial skeleton of vertebrates. It begins immediately behind the pituitary body (hypophysis) and extends to

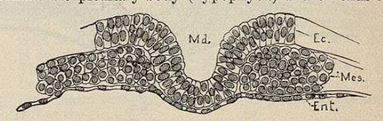

Fig. 3592.—Transverse Section of a Young Mole's Embryo. (After Heape.) *Ec.*, Ectoderm; *Md.*, medullary groove; *Mes.*, mesoderm; *Ent.*, entoderm. Site of the notochord is the central line of the entoderm.

the caudal extremity. It occurs as a permanent structure in the lower types, and as a temporary one in the embryos of amphibia and amniota, including man. Comparative embryology has shown that it is a greatly modified epithelial tube, which arises as a furrow in the median dorsal line of the entoderm, being, in position and mode of development, analogous to the ectodermal medullary canal or primitive tubular nervous system.[5]

Development in Mammals.—The notochord appears very early in the course of development; its differentiation from the entoderm begins at the time when the medullary groove is not fully marked out posteriorly, and is nowhere closed. The notochordal *Anlage* can be first detected in the entoderm just at the front of the primitive streak, as an axial band of cells, which at first in mammals is not well marked off from the mesoderm; as the medullary groove deepens it pushes down toward the midgut until it comes into actual contact with the notochordal epithelial band (see Fig. 3592), thus dividing the mesoderm into two lateral masses; this also leads to the temporary transverse stretching of the notochordal band, which thereby loses for a while its sharp demarcation. It soon re-acquires it, and becomes considerably thicker (Fig. 3593, *nch*) than the adjoining entoderm, and forms a distinct though shallow groove. Subsequently the band separates off, and the entoderm proper closes across under it so that the notochordal band lies between the entoderm and the floor of the medullary groove (or later canal), as shown in Figs. 3598 and 3604, *nch*. This separation does not take place at the anterior extremity of the chorda until somewhat later, so that for a considerable period its front end remains fused with the walls of the midgut (Fig. 3598). The separation from the entoderm is effected, at least in mammals, by the entoderm proper, showing itself under the notochord toward the

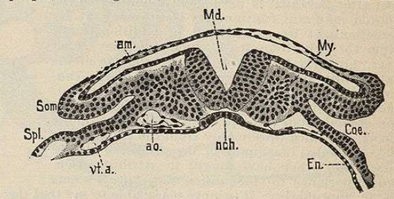

Fig. 3593.—Transverse section of an Embryo Mole, Stage H. (After Heape.) *am.*, Amnion; *Md.*, medullary groove; *My.*, myotome; *Coe.*, cœlom or body cavity; *En.*, entoderm; *nch.*, notochord; *ao.*, aorta; *vt.a.*, vitelline artery; *Som.*, somatic mesoderm; *Spl.*, splanchnic mesoderm.

median line, and when the cells from one side meet those of the other, they unite with them and form a continuous sheet of entoderm below the notochordal cells.

The chorda is now a narrow band of cells, starting anteriorly from the wall of the alimentary tract and run-