The lessened mortality of 1902 is attributable in part, no doubt, to the remarkable and widespread absence of excessive heat during the summer months. In New York City there was only one day in this year in which the maximum temperature rose to 91° F. During the so-called "dog days" the temperature did not go above 88° F., and the nights have been breezy and cool. The State of New York lies in the main track of the cool waves which emerge from the northern Rocky Mountain region and drift thence eastward over the Great Lakes where the conditions have been unusually moderate during the past season, dominated by a series of cool anti-cyclones from the northwest.

The summer rainfall has been excessive, amounting throughout half of the State of New York to more than twelve inches during June and July. This is attributed to an "exceptional strength and persistency in the southerly winds bearing the vapor of the tropical ocean to feed the rain clouds producing the excessive precipitation in our northern States."

The great concentration of population in New York, now embracing over three and a half millions of people, complicates all problems of health and municipal hygiene. There are over forty thousand hotels, apartment and tenement houses in the city. The extremes of society are more widely separated than in any other American city. Philanthropic measures on a very large and generous scale have been carried out for years in New York and have done much to improve the condition of the poor and sick and outcast. It is impossible to enumerate them, but they are rapidly extending their work and are more and more generously supported.

New York is now well provided with small parks in which the poor have an opportunity for recreation and temporarily escape from their crowded quarters. Music is provided on summer evenings, and public-school properties which formerly were tightly closed all summer, are now thrown open as playgrounds for the children. Recreation piers along the river front serve a similar purpose and are specially grateful to tired mothers with sick infants. The floating hospitals of St. John's Guild, the country week associations, kindergartens, and free ice funds contribute largely to diminish misery and promote health. Van Cortlandt, Bronx, and Riverside parks are largely uncultivated, but very popular. Van Cortlandt has fine golf links and skating facilities; in the Bronx there are opportunities for picnicking, rowing, and flower-gathering. Prospect Park, Brooklyn, and Central Park, Manhattan, are the largest cultivated parks in the city. Facilities for tennis, baseball, football, croquet, and amusements for small children are provided. Taken in connection with its superb water front, the bay, the rivers, and the sound, New York, aside from its commercial supremacy, is one of the most desirable places of residence in the world. *Guy Hinsdale.*

NICE.—This city is the most popular resort on the Riviera, as it is the largest, containing 93,760 inhabitants. It is one hundred and forty miles northeast from Marseilles, nineteen and one-quarter miles northeast from Cannes, and nine and one-half miles west from Monaco. It is situated on the Baie des Anges, opening toward the south, at the mouth of the little river Paillon. To the east is the hill of Villefranche, affording protection from the east winds, and to the west the promontory Cap d'Antibes, which affords partial protection from the mistral or northwest wind. To the north are the foothills of the Maritime Alps, the highest of which is Mount Chauve, with an elevation of 2,824 feet, and standing seven miles back from the coast. These foothills, as Dr. Sparks has observed, are too far distant and too much intersected by valleys to afford very good protection against winds coming from that direction.

The city of Nice consists of three distinct portions: the old town, on the left bank of the Paillon; the Port, with a seafaring population; and the Strangers' Quarter, on the right bank of the river, which is the portion occupied by the winter visitors. This last section is the fashionable part of the city, and contains attractive avenues and gardens, broad streets with fine buildings, and innumerable hotels and pensions.

Along the coast runs the Promenade des Anglais, a beautiful, broad-terraced walk, two miles in length. It is shaded by palms and other trees, with a pier and casino near the beginning, and is bordered with hotels and villas.

In the season from November to May, Nice is visited by one hundred thousand people, and it then resembles a northern capital with all its gayety. During the year about one million people are said to visit it. Between the foothills proper and the shore, a distance of four or five miles, is a sloping area of country consisting of low ridges and shallow valleys. Immediately adjacent to the coast is a level tract of ground.

In seeking a health resort along the Riviera it must not be forgotten that Nice is a large, extensive city, and consequently possesses the disadvantages and perturbing influences of a city, viewed from a health-resort point of view.

The sanitary condition of Nice is said to be the best on the Riviera, and the water supply "excellent in quality and quantity" (Linn).

Nice, by reason of its situation and size, possesses innumerable resources for diversion and pleasure. Here congregate visitors from almost every civilized country, and life in this gay winter city is made most attractive for them. At the height of the season the carnival is celebrated with great display. Nice is considered a healthy city, its death rate comparing favorably with that of most French towns. In 1890 there were 21.63 deaths per 1,000.

The following table from Teysseire's figures give some of the meteorological data for the season, October to April inclusive, extending over a series of years:

	October.	November.	December.	January.	February.	March.	April.
Temperature (degrees Fahr.)—							
Mean	61.61°	52.80°	48.2°	46.72°	48.43°	51.22°	57.54°
Absolute maximum	88.16	74.7	65.3	66.6	66	70.5	82
Absolute minimum	36.7	31.1	36.9	36.5	38.3	33.1	37.2
Humidity—							
Mean relative	62.6%	62.4%	63%	65.8%	59.9%	55.7%	60.4%

"The mean annual temperature," according to Burney Yeo, "is 60.3° F. The mean winter temperature 49.1° F., and the mean spring temperature 58.1° F. The minimum temperature at night is 26.6° F. The coldest months are January and February. The relative humidity is small, as is seen by the table. The mean annual rainfall is 32.43 inches, and 19.45 inches for the six winter months November to April. The mean proportion of sunny, cloudy, and rainy days for twenty years is: sunny 219.2, cloudy 77.3, rainy 67.4, and for the winter season, from October 1st to May 31st, sunny 135.8, cloudy 55.3, rainy 52.8." March, April, and May are the windiest months. Of the stormy winds the east wind is the most common, says Burney Yeo, and blows forty-five days in the year.

"Like Cannes," says Huntington Richards, "Nice is one of the windiest of the Riviera resorts. The mistral blows about nine times in the year, chiefly in February and March, and is accompanied by clouds of dust. The average number of days of complete calm during the nine autumn, winter, and spring months, as quoted by Sparks from Teysseire, is 18.6, while the average number of days of gentle wind is 203.8, and that of strong wind days is 69.4, out of which 29.4 occur during the three spring months."

"It must be admitted," says Sir Hermann Weber, "that the changes of temperature are very great, even in sunny places, when passing from a sheltered position to a spot exposed to winds, and likewise on passing from the sun into the shade. A great part of the town is also exposed to the northeast wind, owing to a gap left in the surrounding heights by the Paillon torrent, and the mistral is often very annoying, the protection by some rather low hills to the northwest being inefficient. But the character of the climate is remarkably sunny and invigorating, and the bright days considerably exceed in number the dull and rainy ones" Frost rarely occurs, and then at night. Fogs are unknown. The temperature of the sea water in winter is between 53° and 61° F., and in summer between 64° and 75° F.

"Nice enjoys," says Dr. Wendt, in the previous edition of this HANDBOOK, "nothing more nor less than a fair average of Riviera climate. This means that it is not devoid of drawbacks, and that ideal winters are not found there. Nice is more sheltered than some places, but is nevertheless exposed to the mistral, which blows at Nice just as it blows at most other Riviera spots. It should be borne in mind by invalids and tourists that Nice and the Riviera in general really possess two distinct and different climates, viz., seashore or marine climate and an inland or mountain climate. It is quite well known that immediate proximity to the sea may induce sleeplessness and other symptoms, denoting too exciting an action on the nervous system. The dry, sunny inland air is tonic and sedative; the air in immediate proximity to the shores of the sea is bracing and exciting. The air of the city and its suburbs is often a mixture of the two. It is thus apparent that a number of local climates are found at Nice, concerning which the resident physicians will inform invalids."

As a genuine health resort it will be seen from the preceding climatic considerations that Nice possesses grave defects, and is perhaps the least desirable of the Riviera stations, particularly toward the close of winter and the beginning of spring. As has been well said, it is "rather a pleasure resort than a refuge for invalids." It does, however, offer much to a certain class of patients or semi-invalids. Those seeking sunshine, a certain degree of warmth, dry air, and comfortable living, even luxury, will find it here, under most attractive surroundings.

Anæmia, chlorosis, scrofula, gout, rheumatism, dyspepsia, diabetes, Bright's disease, chronic bronchitis, asthma, and catarrhal conditions of the upper air passages are said to be more or less favorably influenced by the climate of Nice. It is not to be recommended for pulmonary tuberculosis, although it was formerly much resorted to by this class of cases. For the feeble, from old age or other cause, it is of value.

The suburb of Cimiez, two miles from the sea, appears to possess especial climatic advantages. It is said to be better sheltered and has a more equable climate, and its influence is more sedative. The late Queen of England visited this quarter of Nice several times.

Three and a half miles to the east of Nice is Beaulieu, said to be one of the best protected spots on the coast. The high mountains rise directly in the rear, cutting off the north winds. The situation of this little place is most attractive, and the groves of olive trees, orchards of orange and lemon, and the luxuriant vegetation enhance the beauty of the scenery.

The excursions in the vicinity of Nice are many and most attractive, affording marvellously beautiful views of this picturesque region. La Turbie, 1,600 feet above the level of the sea, on the Corniche road between Nice and Monaco, is perhaps one of the most strikingly beautiful spots in all this region of magnificent scenery.

For the true invalid the Riviera may possess many disadvantages, but for one weary with the routine of life, to roam along this coast from Genoa to Cannes in the late spring or early summer when the vegetation is at its best, is a source of unending delight, as the writer can testify from personal experience. *Edward O. Otis.*

NIGHTMARE. See *Consciousness, Disorders of.*

NIRVANIN — diethyl-glycocoll-p-amido-ortho-oxybenzoic acid methyl hydrochloride, $HC(C_2H_5)_2NCH_2.CO.HN.C_6H_4.OH.COOCH_3$—occurs in white neutral prismatic crystals, very soluble in water. Elsberg at Mount Sinai Hospital in New York City, found the toxic dose in rabbits to be 0.22 gm. per kilogram of body weight, while that of cocaine is 0.02 gm. per kilogram. Boiling causes very slow deterioration of anæsthetic power and is practically harmless to the drug for short periods. Solutions purposely infected soon became sterile, and one- to two-per-cent. solutions were still sterile at the end of six months. Joanin found 0.5–0.7 gm. per kilogram toxic for guinea-pigs, while betaeucaine is twice, and cocaine nine times, as toxic. But M. Didrickson affirms that the toxicity is greater than these authors report, very small doses having resulted in excitement, hallucinations, and convulsions.

Clinical evidence seems to favor this new compound as a stable, sterile, very soluble local anæsthetic. In 0.2–0.5-per-cent. solution it is suitable for infiltration anæsthesia, and in five-per-cent. strength for local application. It is somewhat irritating, and if used for the eye should be combined with cocaine. It has but little power of penetration, a five-per-cent. solution applied to a mucous membrane scarcely affecting the submucous tissues. It is said to be of value in pruritus and in dentistry. *W. A. Bastedo.*

NITRIC ACID.—*Aqua fortis.* Under the title *Acidum Nitricum*, Nitric Acid, the United States Pharmacopœia makes official a liquid composed of sixty-eight per cent., by weight, of absolute nitric acid [HNO_3]. Such grade of nitric acid is a heavy liquid of about 1.414 specific gravity, colorless when freshly made and perfectly pure, but, as met with in the shops, apt to be of a distinctly yellowish shade. The acid fumes upon exposure, is powerfully corrosive and stains animal tissues and woollen fabrics a bright yellow. It dissolves silver, mercury, copper, and other metals with evolution of red fumes. It mixes in all proportions with water and alcohol. It is a pretty potent oxidizer, yielding up a portion of its oxygen to oxidizable material, and it has a strong affinity for water, by reason of which affinity, in part, it is powerfully caustic to animal tissues. It should be kept in well-stoppered, dark amber-colored bottles.

The valuable properties of strong nitric acid are the power of the acid to oxidize on the one hand, and to cauterize on the other. By its oxidizing virtues nitric acid is a serviceable disinfectant in situations where its corrosive action will do no injury; and its cauterant powers are convenient for surgical application. The acid burns searchingly and thoroughly, yet not unmanageably. When using nitric acid as a caustic, it is well to bound the area intended for cauterization by a ring of oil or of adhesive plaster, to prevent the action from spreading unduly. The acid is then applied by a glass rod or bit of stick, care being taken to avoid excess. Swallowed in any considerable quantity nitric acid is a powerful corrosive poison, producing effects substantially similar to those caused by sulphuric acid (see *Sulphuric Acid*). The most striking difference between the poisoning by the two agents is, that in sulphuric-acid corrosion the sloughs tend to be brown or blackish, while in that from nitric acid they are yellow. Inhalation of the fumes of nitric acid also may kill.

In proper dilution nitric acid operates physiologically as do all the sour mineral acids (see *Sulphuric Acid*), and shares with hydrochloric acid a sort of selective efficacy in disorders of the digestive apparatus. Vomiting, from many causes, is often relieved effectually by nitric acid, and so is diarrhœa, and so is the functional disorder of digestion commonly ascribed to sluggish action or even congestion of the liver. Even a special curative action over constitutional syphilis has been proclaimed of nitric acid, but is at the present day quite properly discredited. For internal giving, the following preparation of the United States Pharmacopœia is to be used:

Acidum Nitricum Dilutum, Diluted Nitric Acid. This preparation is a simple dilution of the official strong acid with distilled water, in the proportion a little less than six parts of added water to each one of acid. It

represents ten per cent., by weight, of absolute nitric acid; is a colorless and strongly sour liquid, non-corrosive but highly irritant. Its specific gravity is 1.057. The internal dose is from twenty to forty drops, largely diluted with water, and the mouth to be rinsed well after the taking of each dose. *Edward Curtis.*

NITRITES.—Physiological experimentation and clinical testing with a number of different nitrites, both of metallic and ethereal bases, have now developed the fact that such compounds possess certain strongly marked properties in common. These properties evidently belong to the acid radical of these salts, so that the nitrites are to be regarded as forming a natural group of medicines whose peculiar virtues are due to nitrous acid. The effects wrought by nitrites upon the animal system are, broadly, twofold, as follows: On the one hand, a chemical change in the composition of hæmoglobin, and, on the other, an influence upon nervous and muscular structures, showing itself by profound and, in sufficient dosage, even fatal derangement of function. As regards the effects upon the blood, it is observed that in an animal under the influence of a nitrite the arterial and the venous blood both have acquired in common a peculiar chocolate hue, which does not change when the drawn blood is agitated with air. Examined by the spectroscope such blood shows a replacement of the bands of hæmoglobin by those of a new compound (Gamgee) very probably identical with the *methæmoglobin* of Hoppe-Seyler; and, tested chemically, this changed hæmoglobin is found to have its ozonizing power very seriously compromised. Treatment with ammonia restores normal color and normal functional power to this nitrite-poisoned blood. The nervous and muscular derangements produced by nitrites are as follows: In moderate dosage there are felt a fulness and throbbing of the head and neck, with almost simultaneous very rapid and disorderly action of the heart, and excited and panting breathing. The face is deeply flushed and feels uncomfortably hot, but the internal general temperature is found by the thermometer to fall. So, too, though the heart and carotids are felt to throb disagreeably hard, yet arterial tension is proved to suffer a very great decline, obviously due to the general capillary dilatation, of which the flushed face is an evidence. In large doses, as observed in animal experimentation, initial great acceleration of the heart's action, and violent and hurried breathing are followed by slow, irregular, and failing pulse and respiration, fall of temperature, weakened voluntary and reflex motor activity, and finally, death by respiratory arrest. As regards the mechanism of these derangements, the initial circulatory phenomena—acceleration of pulse, capillary dilatation, and sinking of blood tension—are mainly the expressions of paralysis, severally, of cardiac inhibition, of resisting power of the muscular elements of the arterioles, and, to a less degree, of vaso-motor control over the same. The heart failure following large dosage is probably due to direct poisoning of the cardiac musculature; the agitated and panting breathing of the earlier stages of the nitrite effect seems to be secondary to the other derangements, but the final arrest of respiration in fatal poisoning appears to result from direct paralysis of the nerve centres concerned in the function. Similarly, the failure of voluntary and reflex motor power seems to be mainly from paralysis of the motor tract of the cord, although to a certain extent the muscular contractility is itself impaired.

Nitrous acid in combination is thus seen to be an agent that immediately attacks the ozonizing function of the blood and the vital endowments of nerve and muscle tissues. Many have thought that the paralytic phenomena are probably but consequences of the blood lesion, but various physiological considerations make it more likely that they result from immediate and independent poisoning of the substance of the nerve centres.

The principal therapeutic applications of the nitrites are to relieve spasms, or pains referable to spasm, and to arouse the heart in syncope. The most notable instances of the first application are the use of nitrites in the treatment of angina pectoris, spasmodic asthma, and epilepsy. In the first two of these diseases nitrites often prove of astonishing temporary power, but in the last they are, as compared with bromides, second rate in efficacy. Still, in some cases of epilepsy, where bromides have ceased to impress or where the supervention of bromism has forced their discontinuance, nitrites have shown themselves serviceable alternates (Law). For the relief of syncope nitrites are theoretically indicated where the cardiac arrest is presumably referable to excess of inhibition; and, clinically, the nitrite of amyl has been reported to have restored heart action in cases of syncope from emotion, from hemorrhage, and from chloroform poisoning.

The nitrites recognized by the United States Pharmacopœia are the ethereal nitrites of amyl and of ethyl, respectively—the latter in the single preparation, *spirit of nitrous ether* and the salt sodium nitrite. Also, though unofficial, potassium nitrite has been tried in medicine. Properly also, *nitroglycerin* should be included in a summary of the group of nitrite medicines, since, though not itself a nitrite, there is little doubt that its medicinal effects are wrought by a nitrite resulting from decomposition of the nitroglycerin within the body. In this place the nitrites, respectively, of *ethyl*, *amyl*, *potassium*, and *sodium* will be discussed, nitroglycerin being treated of under its own title.

Ethyl Nitrite: $C_2H_5NO_2$. Ethyl nitrite, formerly called *nitric ether*, and now *nitrous ether*, is a compound that forms by reaction of nitric acid with alcohol. It is an ethereal fluid of agreeable apple-like flavor and pungent taste—exceedingly volatile, somewhat soluble in water, and more freely in alcohol. Experimented with in the pure condition, this body produces promptly and fully the classical effects of the nitrites as above set forth (Richardson). It is used in medicine, however, only in the form of a weak alcoholic solution—the time-honored and well-known preparation formerly called *sweet spirit of nitre*, but now official in the United States Pharmacopœia under the title *Spiritus Ætheris Nitrosi*, Spirit of Nitrous Ether. This preparation is made by distilling a mixture of solution, in alcohol and water, of sodium nitrite, and of sulphuric acid. After purification of the ethereal product, enough alcohol is added to make a spirit containing in solution four per cent. of ethyl nitrite. Spirit of nitrous ether is a clear, mobile liquid, volatile and inflammable, of a pale straw color, inclining slightly to green, and a fragrant, ethereal odor. Its taste is sharp and burning. Specific gravity, about 0.836 to 0.842 at ordinary temperatures. It slightly reddens litmus paper, but should not effervesce when a crystal of potassium bicarbonate is dropped into it. It should be kept in small glass-stoppered vials, in a dark place, remote from lights or fire. Spirit of nitrous ether as found in the shops is apt to be of deficient strength from the fraudulent addition of water or alcohol.

The effects of this spirit are the conjoint effects of its two constituents, alcohol and ethyl nitrite. In the small doses commonly prescribed for medicinal purposes the peculiar nitrite effects are but faintly seen, and the medicine operates as a grateful stomachic, which is at the same time mildly diaphoretic and antispasmodic. The spirit is accordingly much prescribed as an ingredient of so-called fever draughts or mixtures, its tendency being to ameliorate the discomforts of the febrile state. In large dosage with this preparation the typical nitrite effects are clearly seen—giddiness, headache, and throbbing arteries having been reported as following an overdose, while in another case death occurred from inhaling the fumes from a broken three-gallon jar of the spirit accidentally spilled in a room. Spirit of nitrous ether is prescribed in doses of from 2 to 4 gm. (practically from ♏ xxx. to fl. ʒ i.) several times a day. The dose may be mixed with water for the taking, or prescribed as an ingredient of mixtures containing saline solutions. Such mixtures should not be ordered in quantity beyond present need, since dilution with water tends to set on

foot chemical changes in the ethereal spirit. Spirit of nitrous ether is an ingredient of the official *Compound Mixture of Glycyrrhiza* ("Brown Mixture") of the United States Pharmacopœia.

Amyl Nitrite: $C_5H_{11}NO_2$. Amyl nitrite is used in medicine under its own form. Under the title *Amyl Nitris*, Amyl Nitrite, the United States Pharmacopœia recognizes the ordinary article of pharmacy, which is an ethereal liquid containing about eighty per cent. of amyl nitrite. The remainder of the percentage is made up of various associated but undetermined ethers. The substance is a clear, very mobile ether, of a pale yellow color, having a fruity odor almost exactly resembling that of ripe bananas, and an aromatic taste. When freely exposed to the air it decomposes, leaving a large residue of amyl alcohol. It is insoluble in water, but soluble, in all proportions, in alcohol, ether, chloroform, benzol, and benzin. Its specific gravity is 0.870 to 0.880, and it boils at about 96° C. (205° F.), giving an orange-colored vapor. It burns with a fawn-colored flame. It should be kept in small, dark glass-stoppered vials, in a cool and dark place. Amyl nitrite is excessively volatile, and the utmost care is necessary to preserve a specimen both from loss of bulk and from spontaneous decomposition by exposure.

Amyl nitrite is the nitrite commonly used in medicine for the specific sake of the nitrite effects proper, and it is, perhaps, the most striking of medicines in the matter of rapidity and intensity of action. From its extreme volatility and pleasant odor the ether is efficiently and conveniently given by inhalation. When the quantity of from three to five drops, poured upon a handkerchief, is inhaled, the subject is conscious, within so short a time as from three to ten seconds, of a sensation of heat, fulness, and throbbing of the face and head, immediately followed by an indescribable and most distressing commotion within the chest, the heart beating fast and furiously, and the breathing being panting and hurried. Giddiness and some muscular languor accompany these phenomena, and perspiration may break out; but in a very few minutes the derangements of function begin to recede, and rapidly, and upon their complete disappearance the subject is left without after-effects, save, possibly, a little dull headache and lassitude, lasting from half an hour to an hour. Assuming such dosing with the ether to have been in a case open to the therapeutic powers of the nitrites, the therapeutic effect will have been as swift and pronounced as the physiological derangement. No medical relief, indeed, so nearly merits the designation of "as if by magic," as the sudden and complete abrogation of an anginal or asthmatic seizure that is so often wrought by the swift and profound action of amyl nitrite. The drug, however, must not be expected to be infallible, for many cases of angina pectoris, of asthma, and syncope—notably profound chloroform syncopes—often set the nitrite at defiance.

Amyl nitrite is an important medicine for the conditions enumerated above as being peculiarly amenable to the nitrite influence, and also has proved serviceable in dysmenorrhœa and other affections, painful or spasmodic. The remedy is most conveniently given by inhalation, from three to five drops being poured upon a handkerchief, and the cloth then held to the nose and mouth. Those who are subject to angina or asthma, and who find relief from amyl nitrite, may carry a small vial of the ether about with them, and, upon the occasion of a seizure themselves dash a few drops upon a handkerchief. Or it may be sufficient to sniff strongly at the opened vial itself until the characteristic sense of flushing and arterial throbbing proclaim the absorption of a sufficiency of the vapor. If a vial be so carried and used, it should be but a small one, not over 2 c.c. (♏ xxx.) capacity, since by frequent uncorking of the bottle the contained sample of amyl nitrite gets "flat" and loses its efficacy through chemical change brought about by the exposures to air. More convenient than a vial, both because of better preservation of the medicine and because of combined rapidity, ease, and certainty of dispensing of the dose, are what are commonly called *pearls* of amyl nitrite. These pearls are small, flattened, sealed chambers, blown of very thin glass, and charged with fixed quantities of the nitrite, generally from to two to five minims. For use a single "pearl" containing the prescribed dose, is crushed in a handkerchief and the fumes of the liberated ether are inhaled in the usual way. The glass of which the pearl is made is so thin that the broken fragments do no harm. These pearls are not official, but are quite universally to be procured. Amyl nitrite can, if preferred, be given by the mouth, dropped upon sugar, or dissolved in alcohol, in doses of from two to five drops.

Potassium Nitrite: KNO_2. Potassium nitrite is not official in the United States Pharmacopœia. It is a colorless salt, slightly deliquescent, soluble in water, and occurring in crystals or in fused sticks. Tested upon man and the lower animals, potassium nitrite is found to produce all the typical nitrite effects; but, as might be expected, more slowly, while yet more enduringly, than amyl nitrite. In the experiments of Weir Mitchell and Reichert[1] full doses made themselves felt by symptoms during a period of from one and a half to five hours, beginning within one or two minutes after swallowing. The doses ranged from three to ten grains, single or repeated, and one individual experimented upon took, in divided doses, within a period of six hours and thirteen minutes, thirty-five grains of the salt. But from the behavior of sodium nitrite of ascertained purity (see below), the question cannot but protrude itself, Was the sample of the potassic salt used in these experiments tested for purity? In the present condition of knowledge of the subject, the comparatively large quantities cited above should certainly not be prescribed medicinally for an untried subject.

Potassium nitrite gives rise, during the period of its action, to eructations of gas of a very offensive phosphureted odor, so disagreeable as even to lead in some cases to nausea and vomiting (Reichert).

Sodium Nitrite: $NaNO_2$. The salt is official in the United States Pharmacopœia under the title *Sodii Nitris*, Sodium Nitrite. It occurs in crystals or fused sticks, freely soluble in water. Commercial samples are rarely pure, being composed of nitrate and nitrite in varying proportions. The better grades may contain 98.5 per cent. of nitrite, but specimens of a salt sold as sodic nitrite have been found to contain but the merest trace of that body —0.011 per cent. only (McEwen). The condition of small crystals, as against that of large transparent crystalline forms or the fused nitrite, is said to be the best for purity. Sodium nitrite deteriorates on keeping—a fact doubtless accounting for the poor quality of the drug so often found.

Sodium nitrite produces the peculiar nitrite effects in a manner generally similar to potassium nitrite, and, when a good sample is employed, can be fatally poisonous, as has been proved by experimentation upon animals. In full dosage with the human subject, extreme distress, and even an alarming condition, have been reported; the prominent complaint being of excessively violent and turbulent heart action, with great giddiness and general weakness. In such cases lividity of the lips and nails has quite commonly been observed.

Therapeutically sodium nitrite has proved efficient in the usual way of nitrites to control the pain in many cases of angina pectoris, and in cases of frequently recurring paroxysms has, in single dose, established freedom therefrom for half a day in subjects to whom amyl nitrite gave immunity for but an hour or two (Matthew Hay). Such immunity, furthermore, was secured by a dosage small enough not to produce any pronounced throbbing or giddiness or headache. In epilepsy this nitrite has also been used with some abatement of the fits; but it is, in a general way, inferior to bromides for this particular therapeusis. From the experience with the salt so far acquired, sodium nitrite can be said to be available for all the therapeutics of the nitrites, and to have the advantages over the ethereal salts of a more deep-rooted and lasting influence, and of much greater

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