physiological action.

the action of nux vomica is that of its principal alkaloid strychnine. externally, the latter is a very powerful antispetic, but is too poisonous for safe use, and in concentrated solution hypodermically it has a decided irritant action on the tissues. internally in small doses its bitter quality makes it a good stomachic tonic. increasing the vascularity of the gastric mucous membrane and promoting the secretion of gastric juice, also the pancreatic and biliary secretions, it aids digestion and sharpens the appetite, but like all other bitter tonics it diminishes digestion when used excessively or for a long time. it stimulates the muscular coat of the intestines increasing peristalsis and thus acts as a purgative, but it restrains the fecal discharges when their frequency is due to atony of the bowel. it stimulates the motor nerve-cells of the spinal cord, the cardiac motor ganglia, the respiratory and vasomotor centres in the medulla, contracting the arterioles all over the body (though by full doses they are relaxed), also the excitability of the sensory nerves and their terminal elements. the result is that respiration is deepened and quickened, the action of the heart is increased and the blood-pressure raised, the field of vision is enlarged, the sight and hearing are sharpened, and the sense of touch is rendered more acute, but the cerebral convolutions are not affected. excreted chiefly by the kidneys, it causes increased frequency of urination, and when taken in excess induces spasm of the neck of the bladder. it probably excites some degree of uterine contraction, but undoubtedly promotes menstruation, disposes to sexuality, and provokes erections of the penis.

the most marked feature of the action of strychnine is the great increase which it causes in the reflex excitability of the spinal cord and other reflex centers, such as the vasomotor and respiratory centres in the medulla. when the dose is large this increase is so great as to induce convulsions and cause death by asphyxia. after a large dose (gr. 1/2) the pupils dilate, the limbs take on jerking movements, respiration becomes spasmodic and the lower jaw stiff, a sensation of cerebral tension may be felt, and sudden shuddering and anxiety follow, the face taking on an unmeaning smile, the rictus sardonicus. a toxic dose (gr. 1/6 to gr. 1/3) produces powerful and characteristic convulsions of a tetanic character. within an hour after its administration, sometimes after only a few minutes, the patient feels a sudden sense of suffocation and dyspnea, the muscles begin to shudder and jerk, the limbs are suddenly stretched out rigidly, with hands clenched and feet arched, then the head is bent backward and the whole body becomes stiffly arched resting on the head and the heels, the belly tense, the chest muscles fixed and the breathing all but arrested. in the height of the paroxysm the face is dusky and congested and the eyeballs project. nearly all the muscles of the body are affected, but those of the jaw are not seriously implicated until near the end, and never so powerfully as in tetanus. the pulse is very rapid and the body-temperature is above normal, but the intellect remains unclouded and the patient often expresses a sense of impending dissolution. after the paroxysm has lasted a minute or two it usually relaxes for a time. in the interval the patient suffers from soreness of the muscles, feels exhausted and sweats profusely, but soon becomes aware that the spasm is returning and may cry out for some one to hold him or to rub his limbs. the convulsions rapidly increase in severity, a breath of wind, the slightest noise, even a bright light, being sufficient to bring them on, and in one the patient may jerk himself out of the bed. at last the respiration stops in the middle of a fit and the heart soon ceases to beat. death occurs, after two or three hours at most, by asphyxia from tetanic fixation of the muscles of respiration, with possible factors in spasm or exhaustion of the heart, consciousness being preserved until carbon dioxide narcosis sets in.

strychnine exerts all the functions of the spinal cord, reflex, motor, vasomotor, and sensory, the latter being the least affected. it has selective action on the large multipolar ganglia in the anterior columns, which it first stimulates and finally paralyzes by over-stimulation, in this respect illustrating the rule that small and large doses of an active agent act antagonistically to each other. a massive dose seems to destroy the spinal and medullary functions as by a single blow. the spasms of strychnine may be distinguished from those of tetanus by their intermittency (the latter being constant), by the meaningless smile, the less marked trismus, the absence of a wound, and the rapid course of the symptoms. thebaine, the tetanizing alkaloid of ephedra, is also a spinal excitant, and acts much the same as strychnine.

strychnine does not directly affect the muscular tissue, the motor nerve-trunks or nerve-endings, or the cerebral convolutions. occasionally, however, large medicinal doses cause a greatly heightened sensibility of the optic
and auditory nerves, so that brilliant lights and loud sounds produce painful impressions; and in a few cases there occurs a true cerebral intoxication resembling a slight degree of drunkenness. It probably affects all the nervous centres in some degree, the sensory, however, much less than the motor and vasomotor ones. It is to some extent oxidized and destroyed in the body, the remainder being eliminated by the urinary, salivary and cutaneous channels. As it contracts the renal arteries, it hinders its own excretion by the kidneys, and being rapidly absorbed it may accumulate in the system if even a small dose is frequently and continuously administered. It is much more poisonous when injected into the rectum than when swallowed.

The fatal dose of Strychnine is placed by Taylor at gr. ½ to gr. ½ for an adult, but recovery has taken place after larger doses, even 7 and 8 grains, cases probably of imperfect absorption, due perhaps to the presence of fat or albumin in the contents of the stomach. A child, aged 2¾ years, died in four hours from a dose of gr. ½. After death from this poison cadaveric rigidity is marked, with opisthotonos, clenched hands, and arms flexed across the chest. The muscular rigidity may persist for several months after death. The face is usually pale, but sometimes livid, the internal organs are gorged with dark blood, and the bladder is generally contracted.

On other animals Strychnine acts as it does upon man, but in different degrees. Birds, guinea-pigs and perhaps monkeys, are comparatively insusceptible to it, while ruminants are less easily affected than other quadrupeds, and cats resist it singularly. Very minute portions in the soil will destroy the life of growing plants.

**Therapeutics.**

Nux Vomica and its chief alkaloid, Strychnine, are exceedingly useful remedies, having a wide range of therapeutic efficacy. They are chiefly employed as stomachic tonics, and as stimulants to the heart, the respiratory apparatus, and the muscular and nervous systems. As the quantity of strychnine in nux vomica varies greatly, it is best to use the alkaloid when its physiological action is desired. More definite dosage being thus obtained. The tincture in 5-drop doses is excellent in atomic dyspepsia and gastric catarrh, especially in droparymph, and in constipation from atony of the bowels it may be given in 10-drop doses with good results, not as a purgative but to increase peristalsis. The extract is much used in laxative pills for habitual constipation. In the vomiting of pregnancy the tincture is frequently an efficient remedy, and in the vomiting of phthisis Strychnine is one of the very best agents. In the condition clinically known as that of torpid liver, where the stools are of pale color and very offensive odor, showing absence of bile therein, the tongue coated with a thick, perhaps yellowish fur, and the patient complaining of headache, fatigue, anorexia, and a bad taste in the mouth, small doses of Strychnine (gr. ¼) twice or thrice daily will frequently act as well as a mercurial, restoring the bile to the stools, and correcting the other symptoms.

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Epidemic diarrhoea and dysentery are often controlled by Strychnine, and in anemia and chlorosis it is an invaluable remedy, especially when combined with iron and quinine. In intermittents, as an adjunct to quinine it is always useful, and in neuralgia, especially of the viscera, and iritis and other forms accompanying anemia and general debility, it is highly efficient, but in these affections very small doses (gr. ¼) should be employed.

Headaches are often controlled by Nux Vomica, especially the sick head- ache of gastric origin, in which minims-doses of the tincture every ten or fifteen minutes frequently give marked relief, and a dose of m[.]x before each meal will prevent frontal headache in many persons liable thereto. A sense of heat and weight on top of the head, accompanied or not by flatulence, and usually occurring in women at the climacteric, will often yield to the tincture in doses of m[.]v before each meal. Its undoubted influence on the pneumogastric makes it a valuable remedy for many kinds of cough, even those of phthisis, bronchitis, pneumonia and emphysema, but it is particularly efficient in coughs of nervous origin, such as periodical cough, night cough, and the paroxysmal laryngeal cough without lung or bronchial symptoms, but characterized by a persistent tickling sensation in the throat. In all these drop-doses of the tincture frequently repeated are more serviceable than larger doses at longer intervals. In bronchial asthma and asthma of nervous origin, in the dyspnea of pulmonary affections and that with cardiac palpitation in hysterical subjects, in irregular action and ever-action of the heart, in functional anæsthesia, hypochondriasis, abdominal cramps, nervous movements accompanying pregnancy, cold hands and feet due to languid capillary circulation, prolapsus ani and urinary incontinence in children, and paralysis of the bladder in old people, small doses of strychnine frequently repeated are remarkably beneficial. In many of these affections the therapeutic action of the drug is unmistakably that of an antispasmodic, illustrating the opposite effects of large and small doses of an active agent, a thoroughly established fact in many cases, though not a universal rule.

Nux Vomica is a most efficient remedy in impending cardiac failure from almost any cause. Even with the pulse imperceptible, the extremities cold, and death apparently imminent, the administration of a drop of the tincture every five minutes has frequently given renewed strength to the cardiac contractions after five or six doses, and initiated an improvement which resulted in eventual recovery. Local paralyses of various forms are well treated by the hypodermic injection of Strychnine into the substance of the affected muscles, and diaphoretic paralyses are almost invariably cured by its internal administration. It may prove useful in hemiplegia when degeneration has not set in, and when the paralyzed muscles are completely relaxed; but it is of no avail in recent cases or when electrical contractility is lost. If used early in cerebral paralyses, especially when due to hemorrhage, it may do serious harm, and in the early stage of organic spinal lesions it may be de-
OLIVE OLEUM.

Brucine acts precisely as strychnine except that it is absorbed more slowly, is much less powerful as a convulsant, and is more poisonous to the sensory nerves (Reichert). If pure it is a powerful local anesthetic in 5 to 10 per cent. solutions on mucous membranes, and in a 20 per cent. solution on the skin. In the latter strength its solutions have been employed with satisfaction for chronic pruritus, and in a weaker solution (5 per cent.) for the local pruritus of inflammation about the external ear, in which Dr. Burnett claims for it more satisfactory results than are obtained with cocaine.

OLIVE OLEUM, Olive Oil, (Sweet Oil, Salad Oil),—is a fixed oil expressed from the ripe fruit of Olea europaea, the olive tree, nat. ord. Oleaceae, which is cultivated in southern Europe, California and Australia. It is a pale-yellow or greenish-yellow oily liquid, of nutty, elegant taste and neutral reaction, sparingly soluble in alcohol but readily soluble in ether. Dose, 5ml–30ml [av. 5ml].

Olive Oil contains in the main the combined glycerides of oleic, palmitic and oleic acids. It is frequently adulterated with cheaper fixed oils, especially coppy oil, hard oil, and cotton seed oil, quantities of the latter being exposed every year to Italy, whence it is returned to us as Olive Oil under a French label. (See Gourmaritz.) It is an ingredient of Unguentum Diachyton, and is the source of the official Soap.

PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Externally used Olive Oil is a good protective from the air, and renders the skin soft and flexible. If rubbed into the integument it is absorbed by the lymphatics and is directly nutritive in effect. Internally it is nutritious and mildly laxative, and in quantity acts as a protective to the mucous membrane against acrid or poisonous substances. Like other oils it is partly emulsified, partly saponified in the intestines, its glycricin being set free and its fatty acids combining with the free alkalies to form soap, which with the emulsion forms the molecular basis of the chyle, entering the blood through the lacteals and being finally oxidized into carbon dioxide and water, though an excess will appear unchanged in the urine. Oils are therefore a food within certain limits, increase the fat of the tissues, furnish heat and force, and lessen the waste of nitrogenous tissue, but are unable of themselves to support life.

Olive Oil possesses some very marked therapeutic powers over any other bland oil or fat. It is a good laxative for infants administered internally, and may be used as an enema followed by warm water. There is much clinical evidence to prove that administered internally it is a very efficient remedy in both nephritic and bilious colic, due to its setting free glycricin, which being absorbed reaches the liver and stimulates the production of a watery bile, which is solvent to the cholesterol of gall-stones. In large doses it has proved very efficient in the treatment of severe dysentery. It is much employed locally. Applied to burns and other acute inflammatory affections of the skin it is an excellent protective, coating the surface and excluding...
the air; and as an ingredient of liniments it acts as a diluent for more active agents. It is used to facilitate friction over enlarged or stiff joints, and in the desquamative stage of scurvy fever is a very useful and grateful application. As an antiseptic in corrosive poisons it acts mechanically by protecting the mucous membrane of the stomach and preventing absorption. In pharmacy its bland, unirritating qualities have procured its common employment as an ingredient of liniments, plasters, ointments and cerates, but the foreign article is so frequently adulterated with inferior oils that Cottonseed Oil is now directed in its place in many official preparations.

**OPIMUM,—**is the concrete, milky exudation, obtained by inclining the unripe capsules of the White Poppy, *Papaver somniferum*, an annual herb of the nat. ord. Papaveraceae, indigenous to Western Asia, but cultivated extensively elsewhere. Its capsules are globular, two or three inches in diameter, and are crowned by a sessile, reduplicate stigma, which distinguishes them from Colocynth and Bael fruits. Opium occurs in irregular lumps or cakes, of dark-brown color, sharp, narcotic odor, and bitter taste; and in its normal, moist condition should yield not less than 9 per cent. of Morphin when assayed by the official process. Doze, gr. ss-ij [av. gr. jes].

Opium contains no alkaloids in combination with meconic, lactic, sulphurous acids; the normal principles Morphin and Muciferine, also glucose, mucilage, rosin, peculiar, cannaconinarf., fats, essential oil, odorous substances, salts of ammonium, magnesium and calcium, and water. Its principal alkaloids are the following: 

**Morphine**, C$_{17}$H$_{21}$NO$_{3}$, or 10 per cent.—the principal alkaloid, occurring in the drug in the form of the trubid morphan. Its properties are analgetic, hypnotic and narcotic. From it by a process of dehydration by heat and hydrochloric acid is prepared the artificial alkaloid *Morphinone*, a powerful emetic and expectorant.

**Codeine**, C$_{18}$H$_{21}$NO$_{3}$, 0.3 to 0.5 per cent.—calmative and when pure a not very active alkaloid, but is frequently contaminated with other alkaloids. *Morphine* may be prepared from it.

**Narcotine**, C$_{18}$H$_{21}$NO$_{3}$, 0.4 to 0.7 per cent.—said by Bernard to be a powerful narcotic, but the preparation used by him was probably impure, and it is now believed to have little or no action.

**Narcotine**, C$_{18}$H$_{21}$NO$_{3}$, 0.5 to 10 per cent.—is antiperiodic and a tetanizer, but wholly devoid of narcotic properties.

**Sedatives**, or *Piperomorphine*, C$_{18}$H$_{21}$NO$_{3}$, 0.2 to 7.1 per cent.—a powerful spinal excitant and retainers, resembling Strychnin in its action.

**Papaverine**, C$_{18}$H$_{21}$NO$_{3}$, 1 per cent.—stands midway between morphine and codeine in its action on the central nervous system, but is a comparatively weak poison.

**Other Alkaloids** are—*Cocainia*, Cryptopine, *Glaucineae*, *Hydrocortine*, Lantho- pin, Linderine, Llundone, Muciferine, Pseudoberine, *Pseudoberine*, Rhamnone, and Triptaphine. Many of them occur only in traces, and some are regarded as probable derivatives of morphine. *Porphyrine* is said to be a complex combination of several of the alkaloids, and not a prismatic principle.

**Official Preparations of Opium.**

**Opium Pulvis, Powdered Opium,** is Opium dried at a temperature not exceeding 185° F. and reduced to a very fine powder. It should contain not less than 12 nor more than 14 per cent. of crystallized Morphine, when assayed by the official process. Doze, gr. ss-ij [av. gr. j].

**Opium Granulatum, Granulated Opium,** is Opium dried and reduced to a coarse powder. It should yield from 12 to 12½ per cent. of Morphine. Doze, gr. ss-ij [av. gr. j].

**Opium Deodoratum, Deodorized Opium,** or *Denatured Opium*, is powdered Opium from which the constituents which are volatile in Petroleum Benzin, namely, Narcotine and the odorous principles, which are supposed to cause the unpleasant after-effects of the drug, should yield to 12 to 12½ per cent. of Morphine, and is a good preparation, being a purified opium with a fixed morphine standard. The proprietary article, named *Chiavata*, is a similar preparation. Doze, gr. ss-ij [av. gr. j].

**Extractum Opium, Extract of Opium,** an aqueous extract containing 20 per cent. of Morphine, and freed from principles insoluble in water. Doze, gr. ss-ij [av. gr. ss].

**Pilulæ Opium, Pill of Opium,** each pill contains about gr. 0.3 of powdered Opium incorporated with Balsam. Doze, 2-5 pills [av. 2].

**Tinctura Opium, Vomitory of Opium, Laudanum,** Opium-strength 10 per cent. or 48 grains to the dram. Morphin-strength about 6 grains (equal to 13 grains of morphine sulphate) to the dram. Ten minims equal 1 grain of Opium or 0.4 grain of Morphine. Sixty minims equal on the average about 100 drops. Doze, 20 to 25 ex [av. 45].

**Resina Opium, Resins of Opium,** Opium-strength 20 per cent., with the aromatics Cinnamon and Cloves of each 1 per cent., in Alcohol and White Wine. A viscous tincture decreased somewhat in strength from the time of its first preparation. Doze, as of Tinctura Opium. Drops of this preparation are larger than those of the tincture.

**Acetum Opium, Vinegar of Opium, (Black Drop),** Opium-strength 20 per cent., with Nitre and Sugar in Dilute Acetic Acid. Is now gr. ss-ij weaker than formerly, having the same strength and dose as Tinctura Opium.

**Tinctura Opium Camphorata, Camphorated Tincture of Opium, Parke, Davis,** has of powdered Opium 4, Benzin Acid 4, Camphor 4, Oil of Anise 4, Glycerin 5, all dissolved in absolute alcohol to 100. The contains nearly one grain of powdered Morphin. It is about 3½ times the strength of Laudanum, and is for infants ½ to 2 drams, for an adult 4 to 6 drams. [av. gr. j]. It is an ingredient of Mixture Glycyphénol Compositi.

**Tinctura Opium, Opium Plaster,** contains of Extract of Opium 6 parts, Adhesive Plaster 100 parts.

**Pulvis Ipecacuanhae et Opil, Powder of Ipecac and Opium, (Dover's Powder),** has of Ipecac 4, powdered Opium 4, Sugar of Milk 8, mixed together into a very fine powder. Doze, gr. ss-ij [av. gr. viij].

**Tinctura Ipecacuanhae et Opil, Tincture of Ipecac and Opium, has of Tincture of Deodorized Opium 100 evaporated to 80, Fluidextract of Ipecac 80, Diluted Alcohol to 100. It is intended to represent Dover's Powder in liquid form. Doze, gr. ss-ij [av. gr. viii].

**Resinæ Glycyphénales et Opil, Tincture of Glycyphén and Opium,** each contains of powdered Opium 3 parts, with Extract of Glycyphén, Aniseed, Sugar and Oil of Anise. Doze, 3 to 7 drops.

**Official Preparations of Morphine.**

**Morphina, Morphine, C$_{17}$H$_{21}$NO$_{3}$H$_{2}$O,—white, prismatic crystals, or fine needles, or a crystalline powder, odorless, of bitter taste and alkaline reaction, almost insoluble in water. Its comparative insolubility makes the salts preferable for use, and as a very small proportion of acid neutralizes it, the dosage is about the same for the alkaloid and its salts, ½ to 1 per cent.**

**Morphine Acetas, Morphine Acetate,—**a white crystalline or amorphous powder of faintly acrid odor, bitter taste, neutral or faintly alkaline reaction, soluble when fresh in 24 of water at 20° F. Doze, gr. ss-ij [av. gr. j].

**Morphine Hydrochloridum, Morphine Hydrochloride,—**white, feathery crystals of sticky taste, of bitter taste and neutral reaction, soluble in 30 of water and in 24 of alcohol at 20° F. Doze, gr. ss-ij [av. gr. j].

**Morphina Sulphana, Morphin Sulphate,—**white, feathery, hackly crystals of sticky taste, of bitter taste and neutral reaction, soluble in 30 of water and in 24 of alcohol at 50° F. Doze, gr. ss-ij [av. gr. j].
OPHIALGIA

It is used by ophthalmologists as a local analgesic in 4 to 7 per cent solution, and has been employed with satisfaction in whistling-cough and other coughs, dyspnoea, and cardiac affections. Dose, 2-3 ml. for children under 2 years, according to age.

Vermisin (Unofficial) is a black powder, insoluble in water, but soluble in dilute acids. It is one of the most toxic agents of the morphine group, and is furnished in tablets containing 20 mg. of morphine, and is a substitute for codeine, both in cough syrups and medicines for asthma. Dose, 2-3 ml. in pill or powder, or in aqueous solution with a few drops of dilute acetic acid.

Peronin, Anosmia-morphine, (Unofficial), is the hydrochloride of the benzal alcohol of morphine, and occurs as a white powder, soluble in water, insoluble in alcohol, chloroform, and ether. It produces a soothing effect on the respiratory passages, and is employed in many cold preparations widely advertised as cough syrups and medicines for asthma. Dose, 0.5-1.5 ml. in pill or powder, or in aqueous solution with a few drops of dilute acetic acid.

Other Alkaloids and their Preparations.

Cocainine, Cocaine, C₇H₁₄NO₂·H₂O, white or yellowish-white, rhombic prism, efflorescent in warm air, of bitter taste and alkaline reaction, soluble in 80 of water and in 17 of boiling water, very soluble in alcohol, chloroform, and ether. Dose, 2-3 ml. (av. gr. 2) but gr. 1/4 has caused alarming symptoms in children. Much of the so-called cedine in the market contains largely of morphine.

Cocainine Phosphate, Cocaine Phosphate, white crystals of slightly bitter taste, soluble in 1/4 of water and in 1/10 of alcohol. In the most soluble salt of cocaine and comparatively uninstant, hence it is well suited for hypodermic use in solution of 1 part in 20 of water. Dose, 2-3 ml. (av. gr. 2).

Cocaine Sulphate, Cocaine Sulphate, a crystalline powder, soluble in about 30 of water, and in 1/2 of hot water. Dose, 2-3 ml. (av. gr. 2).

Sympathomimetic, Sympo Caine, (Unofficial), has a dose of Cocaine Phosphate 2 to 3 gm., dissolved in distilled Water 100, adding Syrup to 500. Of this 1/5 contains gr. 1 of Cocaine Phosphate. Dose, 0.5-1.5 ml., as a tonic.

Cocaine Hydrochloride, Norcocaine Hydrochloride, (Unofficial), Dose, 0.5-1.5 ml., as an antispasmodic.

Incompatible.

Incompatible with Opiates preparations are: Alkalis, Alkaloidal precipitants (see page 35), Carbonates, Catechol, Carbol, Copper salts, Glaub, Iron salts, Kino, Lead Acetate and Subacetate, Lime-water, Mercureic Chloride, Silver Nitrate, Zinc Sulphate. With Morphine Salts are Alkaloidal precipitants (see page 35), Rova, Chlorates, Ferric Chloride, Iodates, Iodides, Iodine, Lead Acetate and Subacetate, Magnesia, Spirit of Nitrous Ether, Silver Nitrate, Silver Acetate, Silver Nitrate, and Silver Nitrate. Coffee, tea, and other alkaloidal reagents (see page 60), Tincture of Copper, Iron and Lead. Physiological Incompatible are: Atropine, Caffeine, Chloroacetate (with amphetamine and codeine), Chloroform, Cocaine, Diamine, Hyoscymine, Nicotine, Phenytoxyn, Physostigmine, Picrotin, Phosphorus, with amphetamine, Veratrum Viride.

Tests for Morphine.

Meric Acid produces an orange-red color, turning yellow, then disappearing. Testsolution of Ferric Chloride gives a blue color changing to green with excess of the reagent, and destroyed by free acids or alcohol, but not by alkali. Iodo Acid liberates Iodium which may be used for other color. Vaght has shown that certain intestinal poisons will have these reactions with these reagents.

PHYSIOLOGICAL ACTION.

Opiate is analgesic, hypnotic, antispasmodic, diaphoretic and narcotic.

It first stimulates and afterwards depresses the cerebrum, heart and respir-
OPIUM.

In medium dose (gr. i) it diminishes all the secretions except the milk and the sweat, the latter being increased; producing dryness of the mouth and throat, check to digestion from decrease of the gastric juice, and decided loss of appetite. The action of the heart is increased, arterial tension is raised and the pupils are slightly contracted. The cerebral faculties are stimulated to a pleasant activity by increased blood-supply, ideas follow each other rapidly through the mind, and an exhilaration bordering on mild intoxication is experienced, succeeded by a calm of variable length. Sleep generally follows, disturbed by dreams, and after waking, headache, malaise, constipation, digestive disturbance and some depression result. The conductivity of the nerves is not affected. Frequently the stage of mental activity is absent, but in persons habituated to the use of opium it is usually well marked. In some subjects a lengthened period of calm repose takes the place of sleep. In others neither calm nor sleep occurs, but the stimulant action of the drug prevails, the spinal functions as well as the cerebral are excited, and great restlessness results.

In full dose (gr. ii) the same symptoms are produced but in greater intensity; the stage of stimulation is much shorter, digestion is arrested, nausea and vomiting produced, also profuse diaphoresis. The conductivity of the nerves is more or less impaired, the respiration, heart and circulation are depressed, oxidation being interfered with and the body-temperature lowered. The pupils are contracted by stimulation of the motor centre through the basal ganglia, intense priapism is produced, especially at the nose, and often spasmodic retention of the urine. Prolonged sopor soon comes on, with irregular and slow respiration, but in some subjects this is replaced by coma-vigil and delirium. After-effects are nausea, depression, constipation, rackling headache, vertigo, anorexia, nasal priapism, and fetid pathological secretions.

A toxic dose produces cold and clammy sweat, very slow pulse, slow and stertorous respiration gradually becoming feeble and irregular, cyanosed face, abolished reflexes, coma gradually deepening, the pupils minutely contracted but dilating as the end approaches, and finally death by paralysis of the respiratory centre. Postmortem examination shows only a wet brain, congested lungs, and engorgement of the venous trunks and of the right heart.

The coma produced by opium-narcosis, when sleep and when a history of the case cannot be obtained, is almost impossiible of differential diagnosis from that due to alcohol, apoplexy, uremia, epilepsy, etc. [See under Alcoholic, page 254.] The odor of the breath may point to laudanum or some other preparation of opium. The pupils are very much contracted in opium poisoning (also from physostigma and chloroform), but they may dilate just before death (as with chloroform), due to the irritation of the centres by the excessive venous condition of the blood. In alcoholic coma they may be either contracted or dilated and in apoplexy they are generally contracted unequally, though in apoplexy of the pons vasalis they may be equally and minutely contracted. The rectal temperature may be an important sign, for in most cases of apoplexy there is an initial fall of temperature with a subsequent rise. A previous history of convulsions points to epilepsy, and the presence of alcohol in the urine, with sometimes edema of the legs, indicates uraemia as the cause of the coma.

The principal action of Opium is exerted upon the nervous system, first affecting the cerebral convolutions, which are briefly stimulated and soon depressed. Next the perceptive and sensory centres in the higher brain are blunted, and the conductivity of the afferent nerves is impaired. Soon the ganglia at the base of the brain are involved, evidenced by the contraction of the pupils, vomiting, and slowing of respiration; the cardiac, vascular and other centres are depressed, but to a less degree than the respiratory and perceptive. The gray matter of the cord, at first stimulated, as shown by the increase of reflex excitability, is also depressed, and locomotion becomes difficult, the motor nerves being paralyzed from the centre outward, but muscular irritability is never lost. Death occurs generally by paralysis of respiration, rarely by cardiac failure.

Metabolism is greatly reduced in activity by Opium, the quantity of urea excreted being markedly lessened, and the biliary and glycogenic functions of the liver being affected, resulting in whitish stools, perhaps jaundice, and certainly decided decrease of the sugar excreted by diabetics when the drug is given to them by the stomach.

The vaso-motor centre is slightly if at all affected by small doses of Opium, but large doses depress it. On the vessels of the skin the first effect of the drug is to cause their dilatation, by turbidity of the vessels of the external ear and a sense of heat therein, and often giving rise to a Vesicular cutaneous eruption accompanied by itching. The continued use of opium causes marked contraction of the capillaries and arterioles throughout the body, the skin is excessively pale and the subject always feels cold at the ordinary temperature of the atmosphere. In those accustomed to its use, it acts as a vaso-motor and cardiac stimulant, raising the blood pressure and increasing the force of the heart. The symptoms of its withdrawal are chiefly due to the fall in blood pressure which occurs when the habitual stimulus is removed.

On the uterine and generative functions Opium exerts a marked influence, stopping menstruation if its use be continued, and in men causing impotence. Both male and female functions, however, return as soon as the drug is discontinued, but the female organs of generation suffer atrophy from its long-continued use. In one case, intra-uterine measurements, taken during a period of two years, showed a diminution in the size of the cavity from 3.1 to 1.9 inches.

The hypnotic action of Opium is produced by a double influence: on the vascular system, causing anemia of the brain; and on the cerebral cells, diminishing their activity and lessening their demand for blood. Its constituting action is shown experimentally to be produced by stimulation of the inhibitory nerves of the intestines through the splanchnics.