

as resembling a "second heart on the right side." Sometimes the growth may be felt in the suprasternal notch.

Percussion.—Dulness according to size and position, usually behind in the interscapular space, or in front on both sides of the sternum, but always with characteristically irregular outlines. Letulle thinks there is sometimes a tympanic resonance over posterior mediastinal tumors which push forward the lung. The heart dulness may be displaced.

Auscultation shows the same signs as in tuberculosis of the glands, and is valuable not only in revealing pressure on the bronchi and lungs, but also negatively in helping to make the diagnosis between mediastinal tumors and aneurism, although in some cases pressure on the aorta may give rise to a systolic sound very like the aneurismal bruit.

Other conditions which must be thought of in diagnosing these tumors are: syphilis with enlargement of the glands and ulceration and cicatrization of the trachea (Lazarus); malignant tumors of the lung and pleura, which, however, do not attain the enormous size of mediastinal tumors, cause metastases in the parenchymatous organs, and do not cause such marked symptoms of venous stasis; phthisis, in which case the sputum would be diagnostic; tuberculosis of the glands, which in adults is usually attended with tuberculosis in some other organs, and in children is common, while mediastinal tumor is rare; and, most important of all, benign tumors which are operable. In this last case the long continuance without marked increase of the symptoms is the chief aid to diagnosis, except when a connection with the thyroid gland can be made out.

The treatment of tumors in the mediastinum is possible only in the cases which are fit for operation; in all others we can only seek to relieve the symptoms. Leeches applied to the suprasternal notch or large sinapisms to the chest will sometimes relieve the dyspnoea. The physician is often driven to try tracheotomy to relieve this most distressing symptom, but this is useless, the compression being too far down, and the insertion of a cannula being apt to set up dangerous inflammation, even pressure gangrene. In the last stages pain may be so great as to defy opiates, but it may partially yield to the application of a large ice-bag to the chest or to the constant electric current with large flat electrodes. Hoffman got temporary relief in one very obstinate case by injecting carbolic acid into the tumor. All varieties of counter-irritation have been tried, from wet and dry cupping to *Baunscheidtismus*, but without encouraging results.

MEDIASTINITIS.—Inflammations of the mediastinum may be described as traumatic, extension, metastatic. The first class is caused by external wounds or injuries from foreign bodies in the œsophagus, instances of which are not infrequent, judging from Hare's statistics. Those which belong to the second class are the most common, and may be non-suppurative, suppurative, or tuberculous. The non-suppurative are secondary to pericarditis or pleuritis. Hare has collected sixteen such cases. Suppurative inflammation may extend from the neck along the large vessels, or from the larynx and trachea, or from the œsophagus, or from suppurating retropharyngeal glands in children, or from suppuration in the lungs or thymus or bronchial glands.

Tuberculous inflammation extends from the vertebrae or lymph glands, and is generally suppurative also. Metastatic mediastinitis has been found in typhoid fever and erysipelas, and in a few instances of acute articular rheumatism, pneumonia, and smallpox. It is much more common in men than in women; the proportion, according to Hare, being as fifty-eight to seven.

Mediastinal abscesses are apt to force their way through to the surface of the chest, but they have been known to break into the trachea, œsophagus, pleural cavity, pericardial sac, left ventricle, and aorta.

The symptoms are as follows: throbbing pain in the chest and back, increasing until the abscess is formed or until it evacuates; a feeling of heat and fulness; fever, chills, sweating, and rapid pulse. Symptoms of com-

pression resemble those in tumors. Physical signs are usually absent until the abscess is fully enough developed to give symptoms of compression and suppuration. Edema over the sternum is a valuable diagnostic point; the rapid course of the disease is also important.

Treatment consists in opening and draining the abscess, sometimes by resection of a part of the sternum. Heyfelder reviews twenty-five cases of resection with fifteen recoveries. Hemorrhage and emphysema of the mediastinum have been reported following wounds of the chest, œsophagus, or trachea. The latter is usually not fatal, even when the tissues of the neck and chest are filled with air. Knistern reports an interesting case in which the heart sounds were completely obliterated and a tympanic resonance was heard over the heart dulness and over the upper part of the liver; but the air was rapidly absorbed and a complete recovery followed.

Very little is known of syphilis of the mediastinum. It appears to be usually regarded as an extension from gummata of the sternum or ribs. Weber had a case of gumma of the inner surface of the sternum with enlargement of the mediastinal glands. These large masses give rise to symptoms like those of tumors, and their true nature is revealed only at autopsy. *Alice Hamilton.*

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MEDICAL LAKE.—Spokane County, Washington.
POST-OFFICE.—Medical Lake. Hotels.

ACCESS.—Via Central Washington branch of the Northern Pacific Railroad to Cheney; thence eight miles north-west to lake.

This remarkable body of water is about a mile and a half in length by one-half mile in width. It is located on an elevated plateau, and is surrounded by an evergreen border of pine, fir, and tamarack. There are four good hotels on the lake, commodious bathhouses, splendid drives, delightful camping places, and an abundance of fish in the neighboring lakes. The East Washington Hospital for the Insane is also located here. The waters of the Medical Lake were analyzed by G. A. Mariner in 1882, with the following result:

ONE UNITED STATES GALLON CONTAINS:	
Solids.	Grains.
Sodium carbonate.....	63.54
Lithium.....	Trace.
Magnesium carbonate.....	.23
Iron carbonate.....	.33
Calcium carbonate.....	.18
Sodium chloride.....	16.37
Potassium chloride.....	9.24
Aluminum oxide.....	.18
Sodium metasilicate.....	10.63
Potassium sulphate.....	Trace.
Sodium bicarbonate.....	Trace.
Organic matter.....	.55
Total.....	101.45

The water has excellent properties as an antacid, laxative, and diuretic. It is used commercially. The evaporated salts resulting from distillation are also packed and shipped to different sections of the country. It is said that an excellent quality of soap is prepared from the residue. *James K. Crook.*

MEDICATING, MODES OF.—Medicines act only by coming into actual contact with the part primarily to be impressed, and the various modes of medicating, so called, are simply different methods for securing such contact, varying according to circumstances. Modes of medicating fall naturally into two categories, namely, first, modes of direct medication of surface parts immediately accessible to local application; and, secondly,

modes of medicating internal parts accessible only through the avenue of the blood. Medication by any of the methods of the first category is commonly spoken of as local medication; and by any of the modes of the second category as general medication. But concerning this phrase "general medication," the point must be noted that, although in one sense medicating by the avenue of the blood is always "general," for the reason that the medicine necessarily goes wherever the blood circulates, yet the therapeutic application is in many instances as purely local as if the drug had been locally applied from without. Thus, for instance, copaiba, swallowed, circulates generally with the blood, in which its virtues become dissolved, but yet the main influence of the drug and the entire therapeutic purpose thereof are commonly upon the surface of the urethral mucous membrane, with which the medicine comes into contact by excretion by the kidneys, dissolved in the urine.

I. MODES OF MEDICATING BY DIRECT APPLICATION.—In medicating the skin, the following points are to be noted: *First*, although the skin is comparatively insensitive and non-absorbent and so will bear stronger applications than will mucous membranes, yet there are many substances that will severely irritate even the sound skin, and many others that can be absorbed by the skin in sufficient quantity to produce constitutional effects; *secondly*, different parts of the skin differ greatly in sensitiveness, thin parts being more sensitive than thick, and, similarly, individual skins will vary in tenderness, thin and fine-textured skins being more sensitive than the coarse and thick. Also, of course, a clean skin is more readily affected than is a long-unwashed and dirty one. The *third* point is, that in the medication of hairy portions of skin, the effect will be far more thorough if the hair be shaved, or at least cut short, before the application is made. *Fourthly*, it is to be remembered that the skin, as a whole, constitutes an organ whose functions it will not do wholly to suppress. The persistent covering of the entire skin with matters impervious to the air is therefore fraught with mischief, and even danger.

Besides the skin, the mucous membranes present surfaces more or less accessible for direct medication. Here, far more than in the case of the skin, is to be found a great difference in sensitiveness in different parts. According to locality, therefore, applications intended for mucous membranes must vary widely in strength. The least sensitive mucous membranes are those of the alimentary canal, and of the female generative organs; the middling sensitive are those of the conjunctiva, the air passages beyond the larynx, the middle ear, the lower portion of the nasal cavity, and the urethra; while the extremely sensitive are the mucous surfaces, respectively, of the cornea, the upper portion of the nasal cavity, and the larynx. Another point is the very different degree of accessibility of mucous membranes. Some mucous membranes, as for instance that of the mouth, are as easily accessible as the skin itself, while others, such as that of the bladder, can be reached only by special instrumental appliances. The practical points concerned in medicating the different mucous membranes are as follows:

Medication of the Conjunctiva.—The conjunctiva is directly accessible, and medicaments can be applied in solution, in ointment, in powder, or, as in the case of nitrate of silver, by a touch of the solid substance. The only technical point in medicating the conjunctiva is thoroughly to expose the retrotarsal fold for the application, when, as happens in the majority of cases in conjunctival affections, the point of greatest intensity of the disease is situated exactly in that locality. To this end the patient should be directed to cast the eyes strongly downward, while the surgeon draws the everted upper lid upward and backward. Another caution well to note in this place is to avoid any application of a salt of lead, if there be any loss of the epithelium of the cornea, whether by an ulcer or an abrasion. This, because upon any exposed surface of corneal tissue proper, the application of a lead solution will determine an indelible, white opacity.

Medication of the Nasal Cavity.—The lower portion of the nasal cavity may be medicated by the snuffing up of dry powders or of solutions—a very imperfect measure in either case. More thorough is the blowing in of powders by a blast from a rubber bag, or the injection of solutions. But, as regards the latter procedure, the danger must be remembered of the injected fluid passing up the Eustachian tube to the middle ear, with, possibly, disastrous consequences. Direct injection from the anterior nares, and the so-called *nasal douche*, where the injected fluid enters one nostril and, passing around, escapes anteriorly by the other, are measures nowadays very justly condemned by the majority of practitioners. The safest means of flushing the nasal cavity with a solution is by the *posterior nasal syringe*, but even this measure is accused of occasionally producing middle-ear inflammation. *Atomized spray*, driven into the nose from before or behind, is, naturally, far safer than solutions in bulk. To medicate the upper portion of the nasal cavity, the same means are available as just described, with the same inherent dangers; the only point to note being that this same upper portion of the Schneiderian membrane is very much more sensitive on the one hand, and difficult of access on the other, than the lower. It is often doubtful whether insufflations or injections, whether of solutions in bulk or of spray, reach the upper regions of the nasal cavity at all. The mucous cavities, respectively, of the ethmoid and sphenoid bones, the frontal sinuses, and the antrum are practically inaccessible to direct medication.

Medication of the Eustachian Tube and Middle Ear.—In cases of perforation of the ear drum the middle ear is accessible to injections through the external auditory canal, but otherwise can be reached only by injections or insufflations through the *Eustachian catheter*, a specially shaped catheter introduced through the nostril so as just to engage the opening of the Eustachian tube. Concerning medication through the Eustachian catheter, the only points proper to note in this article are that, in the first place, the manipulation of the catheter itself requires technical knowledge and skill, and in the second that the mucous surfaces under consideration are very sensitive to irritation, so that mischief instead of benefit may easily result from over-zealous practice of direct medication.

Medication of the Mouth and Pharynx.—The mouth may be medicated by mouth-washes, by troches, or by direct localized application at the hands of the surgeon in any of the ordinary ways. The pharynx is medicated by applications of spray, by injections by means of the posterior nasal syringe, or by solutions exactly applied by a mop attached to a properly shaped handle introduced through the mouth. Strong applications are best made by the latter method, since sprays and injections may, undesirably, find their way into the larynx or into the posterior nares. *Gargling* is fairly efficacious for medicating parts anterior to the faucial arch, but is of little avail for affecting the pharyngeal region.

Medication of the Larynx.—The larynx is medicated by the inhalation of vapors or of solutions in spray, or, at the hands of the surgeon, by local touch by means of special probangs applied with the help of a view in the laryngoscope. Technical training and a delicate hand are necessary in laryngeal manipulation, and the extreme sensitiveness of the mucous membrane of the larynx to irritant applications must ever be borne in mind.

Medication of the Respiratory Mucous Membrane beyond the Larynx.—The air passages beyond the larynx can be medicated directly only by *inhalation*. Vapors and solutions in spray can be inhaled with a view to medicinal effect, but the vapors must be such as are non-irritant, and as regards sprays, the whole drift of exact observation tends to strengthen the belief that fluids inhaled in spray never penetrate beyond the larger bronchial tubes.

Medication of the Bladder and Urethra.—The urethra is accessible by injections, by medicated "bougies" of cacao butter, and by the sound, smeared with the medication in ointment or in any pasty condition. The bladder

is reached only by injection through the catheter. The mucous membranes of these localities belong to the sensitive class, and the introduction of fluids or instruments not germ-sterilized into urethra or bladder may determine cystitis. What is practically a local medication of the urinary mucous membrane is afforded by the action of such medicines as buchu, cubeb, and copaiba, when taken by swallowing. The active principle of such drugs is excreted, possibly more or less changed, by the kidney, and so, being dissolved in the urine, makes a local impression upon the mucous membrane of the urinary tract.

Medication of the Female Genital Mucous Membrane.—The *vagina* can be reached by medicated suppositories, by injection, or its surface being exposed by a speculum, by brush or probang at the hands of the surgeon. As a considerable volume of fluid is required for a thorough vaginal injection, the "fountain" syringe is here peculiarly convenient. A fountain syringe is simply a good-sized rubber bag with a long tube leading from its lowest point. The bag is filled with the injection fluid and hung upon the wall at a height of three feet or more from the level of the part to receive the injection, whereupon gravity determines a steady and strong flow. The force of the stream is regulated by the height at which the bag is hung. The rubber tube is fitted with the necessary nozzle and also with a simple form of clamp to shut off the flow. The *uterus* is accessible to special instrumental appliances, including means for making injections; but, as regards the injecting of this organ, it must never be forgotten that there is an open communication through the Fallopian tubes between the cavity of the uterus and the general peritoneal sac. Peritonitis and death have more than once resulted from a uterine injection.

Medication of the Mucous Membrane of the Alimentary Canal.—The mucous membrane of the *stomach* is, of course, easiest reached by administration of a drug by swallowing; otherwise by use of the stomach pump. A stomach pump is a good-sized syringe with a double nozzle end fitted with a two-way stopcock appliance. From the nozzle end two tubes make off at right angles, whereof one goes into the stomach and the other into a basin. By proper manipulation of the two-way cock, fluid may be drawn up from the basin and thereupon discharged into the stomach, or *vice versa*. The mucous surface of the *small intestine* is practically accessible to direct medication only by administration of the drug by swallowing; but that of the *large intestine*, and most especially of the *rectum*, can be reached also by anal injection, or in the case of the rectum, also by suppository. A rectal injection intended for local medication should be small in bulk—not over two fluidounces; should be blood-warm, and should be *slowly* administered. The rectum should first be washed out by injections of plain water. In practicing a rectal injection, the points should be observed to have the nozzle of the syringe *warm* and *well greased*, and to direct the same, after the sphincter has been passed, *upward and backward*, to conform to the lay of the rectum in the concavity of the sacrum. In the case of children crying during the operation, the further point should be observed to force entrance during *inspiration* only, when the abdominal tension is relaxed, merely holding ground, without attempting to advance, during the strained *expiration*. On withdrawing the nozzle after the injection has been finished, a little firm pressure with the fingers or a towel end should be made upon the anus until all reflex quivering of the sphincter shall have subsided.

In the medication of mucous membranes the use of solutions in condition of *spray* has several times been mentioned. A fine spray, for medicinal purposes, is gotten by the well-known so-called *atomizers*. An atomizer is, in essence, a very simple contrivance. A tube leading up from a vessel of fluid ends in a capillary orifice. Close to this orifice, and at right angles in direction, is set a similar capillary orifice of a second tube leading from some arrangement for delivering a blast—as of air from

a rubber bulb squeezed by hand, or of steam from a small boiler set over an alcohol lamp. Such blast, then, by its close forcible passage immediately across the fine orifice of the first tube, sucks out the air from such tube, and, of course, also the fluid, which at once rises up the tube from the reservoir in which the tube is set, following the exhaustion of the air. But now, no sooner does a drop of fluid present itself at the capillary orifice of the tube through which it is drawn than, by the same blast that has sucked it up, such drop is immediately and literally blown to atoms—dispersed, that is, in exquisitely fine spray. In different atomizers different arrangements of the two related orifices obtain, but the finest spray is always to be found where the device is the original and simple one of having two very fine orifices accurately and closely set at right angles to each other. The *driving blast* is ordinarily obtained by hand pressure on a rubber air sphere connected with the atomizer proper by a rubber tube. Such "hand atomizers" also commonly have a second air sphere let into the rubber connecting tube between the terminal bulb and the atomizing apparatus. This second chamber, by its elastic distention, keeps up an air pressure during the intermittence of the play of the bulb directly compressed, and so a perfectly steady blast can be secured indefinitely. Should a momentary blast only be wanted, the same can be obtained by direct compression of the middle reservoir bulb instead of the terminal one. *Steam* atomizers, where the driving blast is steam from a small boiler, are particularly applicable for inhalations of spray, or for the delivery of spray of an "antiseptic" solution during surgical operations—in short, for all such occasions as require a prolonged atomization too tiresome to be maintained by use of the hand apparatus.

II. MODES OF MEDICATING THROUGH THE AVENUE OF THE BLOOD.—As already stated, the only way to medicate parts out of direct reach is to put the medicine into the general vascular circulation. Nothing is easier, but the general vascular circulation. Nothing is easier, but now the point obtains that *localization* of the medication is impossible. The medicine will necessarily be diffused throughout the whole volume of the blood, and so will go to all parts alike where blood circulates. Accordingly, in general medication, the point always has to be considered whether the expected benefit to the organ or function to be treated may not perhaps be more than counterbalanced by derangement produced elsewhere. In view of this point the standard rule obtains always to select that medicine which will accomplish a maximum of the effect sought with a minimum of by-derangement.

For the introduction of a medicine into the circulation there are several means, as follows: The easiest and altogether most natural one is, of course, to give the medicine *by swallowing*, whereupon absorption of the medicine into the blood occurs by the same avenues as in the case of the products of digestion. And an inherent advantage of this method is that, to a considerable extent the stomach will assume the functions of a pharmaceutical laboratory, and extract the active ingredients of drugs administered in more or less crude condition. But despite these various advantages, there may arise circumstances making it unadvisable, or dangerous, or futile, to give medicine by the stomach. Thus, *First*, a medicine given by swallowing may greatly derange the function of the stomach itself—destroying appetite, upsetting digestion, or even provoking nausea and vomiting—when the same dose, given by the rectum or injected subcutaneously, might be borne without any substantial derangement; *secondly*, the giving of anything by swallowing may be debarred by the fact of a corrosive poisoning of the stomach, or of a stricture of the œsophagus; and *thirdly*, such administration might be useless, or worse than useless, because of *absorption* being in abeyance through *narcotic* poisoning, or through general collapse from any cause; *fourthly*, the very chemical activity of the gastric juices, so serviceable to extract certain active principles from crude preparations, may yet affect certain others injuriously; *fifthly*, the pres-

ence of food in the stomach may, in certain cases, seriously delay or impede absorption of the medicine.

Besides the stomach the *rectum* is more or less available as an avenue of approach to the circulation. The rectum, however, has not the chemical power of the stomach to extract, in soluble form, active principles from crude drugs. Hence, in aiming to medicate the system by the rectum, it is always advisable to use a form of medicine wherein the active principle is either already in aqueous solution, or is at least in such state as to be capable of dissolving directly in the fluids naturally to be found in the rectal cavity. Another special point is to give by the rectum about twice the dose of any given medicine that would be administered by the mouth.

Still another natural avenue of approach to the circulation is afforded by the *lungs*. Absorption by the lungs is speedy and thorough; but obviously the use of this avenue is limited, since only medicines that are at once *volatile* and *not unduly irritant* can be introduced to the circulation through the lungs.

Next, it is possible to introduce medicines to the blood through the avenue of the *skin*, and that, too, in a variety of ways. Of these ways the simplest is merely to lay upon the skin cloths wetted with a fluid medicine, trusting to direct absorption of the medicated solution through the tissue of the skin. With some medicines, under such circumstances, absorption unquestionably occurs; but at best the method is so crude, and the results are so uncertain, that the procedure is not to be commended. The next method is by so-called *inunction*—the rubbing into the skin of the medicine in condition of ointment or oily solution. By this means, with certain drugs, certain, thorough, and rapid absorption is effected, so that inunction is an established and valued method of accomplishing constitutional medication. The only drawbacks to the method are the tediousness of the application, and the occasional soreness of the skin that may result from a repetition of inunction upon an identical skin area. A third method is *fumigation*, wherein a volatilizable medicine is sublimed in presence of aqueous vapor, and made to condense upon the skin. Under the conditions of such procedure, absorption is as rapid and thorough as in the case of inunction, and fumigation is, indeed, an alternate method to inunction. Obviously, however, but a limited number of drugs are capable of application by fumigation, and, practically, the method is confined to the administration of *mercury*. (For details of the method see Mercurous Chloride, under *Mercury*.) A fourth method is by the procedure of raising a small blister, and then, exposing the raw surface under the bleb, applying to the same the medicine in concentrated condition. This method, called the *endermatic*, is rapid and certain, but is painful and barbarous, and has practically been supplanted by the fifth and last method, that, namely, of injecting the medicine, in solution, by a small syringe, into the subcutaneous connective tissue—the well-known and popular *hypodermatic* method. By the hypodermatic method absorption is pre-eminently rapid, thorough, and certain—all impediments of varying gastric conditions on the one hand, or of nervous ones on the other, being void—and also, often, the medicinal impression is more radical than when the same drug is given in other ways. There are two drawbacks to the method, *first*, that it can only be used in the case of medicines that are, at once, *fairly non-irritant*, *soluble in bland menstrua*, and *effective in small dose*; and, *secondly*, that the injection requires the technical skill of the physician himself, or of a trained nurse. (For details of the hypodermatic method, see *Hypodermatic Medication*.)

Lastly, medicines can be introduced into the circulation by direct *intravenous injection*. In the case of *active* medicines this procedure is so dangerous as to be unjustifiable, but for the *passive* purpose of increasing the volume of the circulating fluid in order to arouse the heart in collapse, it is safe and serviceable. Milk, defibrinated blood, desiccated blood redissolved, and "indifferent"

saline solutions, are the substances commonly injected. (For details of the method see *Transfusion*.)

Edward Curtis.

MEDICINES, FORMS OF.—Under this title will be discussed the class characteristics of the various kinds of medicinal preparations, so far as they immediately concern the physician. For convenience of reference, the different forms of medicines will be taken up in alphabetical order, and it will be understood that, in matters of pharmacopœial authority, the standard followed is that of the United States Pharmacopœia, Seventh Revision (Revision of 1890).

ABSTRACT (Latin *Abstractum*, unofficial). By this term there was formerly designated a preparation, in dry powder, of a vegetable drug, of twice the medicinal strength, weight for weight, of the crude drug. An extract was first made, which was then brought to standard strength by the addition of sugar of milk. The class of abstracts was dismissed in the 1890 revision of the United States Pharmacopœia.

BOLUS (Latin, *Bolus*; unofficial).—By a *bolus* is understood to mean a mass of a medicinal substance larger than a pill, which is yet to be swallowed whole after the manner of pills. Such form of administration of a medicine is so obviously objectionable that nowadays the "bolus" is rarely used.

BOUGIE (Latin, *Bougia*; unofficial).—A *bougie* is an elongated plug of cacao butter for insertion into the urethra or the uterus. The necessary medicament is incorporated into the substance of the bougie which melts in the natural warmth of the part.

CERATE (Latin, *Ceratum*).—A *cerate* is a preparation whose basis is an admixture of a fatty and a waxy body or bodies, so proportioned that the product shall be of fairly firm consistence, and of a melting point above that of the temperature of the skin. A cerate thus maintains the consistency of a soft solid when applied to the skin, and is intended to serve as a permanent dressing, being used spread upon a backing of muslin or kid. The preparation of the United States Pharmacopœia whose official title is the simple word *Ceratum*, *Cerate*, is a non-medicated simple mixture of white wax and lard, in the proportion of thirty parts of the former to seventy parts of the latter. Including this preparation, six cerates are official in the United States Pharmacopœia.

CONFECTIO (Latin, *Confectio*).—A confection is a material of the quality and composition of soft confectionery, intended as a pleasant menstruum for active medicines. Two confections only are official in the United States Pharmacopœia—one, a *confection of rose*, simply rose-flavored confectionery, suitable for extemporaneous medication, and the other a *confection of senna*, a confection feebly medicated with the drug senna. Confections are, of course, intended to be eaten, and are therefore appropriate for such medicines only as do not taste unduly bad. Confections are objectionable, generally, because of the large amount of saccharine-matter that they contain.

DECOCTION (Latin, *Decoctum*).—When a crude vegetable drug is actually boiled in water for a greater or less time, the resulting aqueous solution of such principles as the boiling water will have extracted is termed a *decoction*. The process of decoction is suitable to such drugs only as do not have their active principle or principles either decomposed or dissipated by the heat of boiling; but even in the case of decoctions of appropriate drugs, the preparation will spoil by keeping, unless, indeed, the original drug contain some antiseptic substance. Medicinally, decoctions are objectionable because bulky, ill-tasting, and necessarily containing other constituents of the original drug substance than the active principle. The United States Pharmacopœia ordains two specific decoctions, namely, *decoction of ectraria* and *compound decoction of sarsaparilla*, and also a general formula for the making of decoctions of any drugs extemporaneously prescribed. Such general formula is as follows: "An ordinary decoction, the strength of which is not directed

by the physician, nor specified by the Pharmacopœia, shall be prepared by the following formula: take of the substance, coarsely comminuted, 50 gm.; water a sufficient quantity to make 1,000 c.c. Put the substance into a suitable vessel provided with a cover, pour upon it 1,000 c.c. of cold water, cover it well, and boil for fifteen minutes. Then let it cool to about 40° C. (104° F.), express, strain the expressed liquid, and pass enough cold water through the strainer to make the product measure 1,000 c.c. *Caution.*—The strength of decoctions of energetic or powerful substances should be specially prescribed by the physician" (U. S. P.). The average dose of a decoction prepared by the above formula is from one to two fluid-ounces.

DISC (Latin, *Discus*; unofficial).—A *disc*, as a form of medicine, means a small gelatin scale of microscopical thickness, impregnated with some medicinal substance, generally a salt of an alkaloid. Such medicated discs are especially devised as a convenient means of applying accurately apportioned, minute quantities of mydriatic or myotic alkaloidal salts to the conjunctiva. When so used the disc is lifted by the touch of a moistened, fine camel's-hair pencil, and gently laid on the inner surface of the lower lid, whereupon the gelatin of the disc is speedily liquefied by the warmth and moisture of the mucous membrane, so setting free the contained charge of medication.

ELIXIR (Latin, *Elixir*).—The *elixir* of modern pharmacy is a preparation consisting of diluted alcohol, sweetened and aromatized, and containing, in weak charge, in solution, some medicinal substance or substances. The United States Pharmacopœia makes official a so-called aromatic *elixir*, intended as a simple, pleasantly flavored elixir basis, to be medicated by the prescriber at pleasure. This official elixir, like the majority of proprietary elixirs, is no less than twenty-five per cent. strength of alcohol—a fact seriously to be borne in mind in relation to the tablespoonful doses in which elixirs are commonly designated to be prescribed.

EMULSION (Latin, *Emulsio*).—An *emulsion* is a fluid mixture consisting of a fatty body diffused in a state of fine mechanical subdivision through a more or less viscid watery menstruum. Milk is a natural example of an emulsion. Emulsions constitute a serviceable form in which to administer fixed oils whose dose is considerable—such as castor oil and cod-liver oil—for the double reason that, in such condition, the oil is less apt to nauseate, and also permits of having its taste quite perfectly disguised. The agents most commonly used to emulsify fixed oils are gum arabic and yolk of egg. Of these emulsifiers gum arabic is the more generally serviceable; emulsions made with egg yolk being not so ready to form, and also, after making, being more prone to spoil. Gum tragacanth also may be used, but gives inferior results; and alkaline solutions, often quoted as emulsifiers, work with oils a chemical change—saponification—instead of the purely mechanical subdivision properly understood as emulsification. To emulsify with gum arabic, a thick mucilage is first made with a quantity of the gum equal to one-half the weight of the quantity of oil to be emulsified, and to this mucilage the oil is gradually added with thorough trituration, one portion of oil not being added until the previous one has been fully emulsified. After emulsification the product may be diluted with an aqueous menstruum, in quantity up to from eight to ten times the volume of oil represented in the emulsion. When yolk of egg is to be used, it should be taken in the proportion of one yolk to each fluidounce of oil. *Volatile* oils in considerable quantity are best emulsified by first mixing with two or three volumes of a bland fixed oil, and then emulsifying the mixture as in the case of a simple fixed oil. Mixtures of *resins* and of *balsams* in fine mechanical subdivision in viscid menstrua are also sometimes called emulsions. Such emulsions may be procured by the use of the same emulsifiers and method as above described. *Gum resins* may be emulsified by trituration with water alone, the gum of the gum resin serving to make the necessary mucilage for

emulsification. Four emulsions are official in the United States Pharmacopœia.

EXTRACT (Latin, *Extractum*).—The word *extract*, unqualified, expresses a preparation of solid or semi-solid consistence, made from a crude vegetable drug by one or other of the following processes. In by far the majority of instances—indeed, in the United States Pharmacopœia, in all instances but one of official extracts—the crude drug is acted upon by a solvent, generally alcohol or alcohol diluted, and the resulting solution is evaporated down to the proper consistence. In the other case, exemplified in the United States Pharmacopœia by the single instance of extract of taraxacum, the drug in the fresh state, bruised in a mortar with the addition of a little water, until reduced to a pulp, is subjected to expression, and the expressed juice, strained, is then evaporated to a pilular consistence. Extracts are of varying consistence, some being sufficiently hard to admit of pulverization, while others—and, indeed, the majority—are semi-solid in consistence, and of just the right degree of stickiness to permit of ready rolling into pills. Extracts are, for this latter reason, very commonly prescribed in pill form, and extracts of indifferent drugs, such as gentian, are much used as pilular excipients for dry powders. Extracts, especially those—such as extract of taraxacum—which are made by expression of the fresh drug, are apt to be uncertain in strength.

FLUID EXTRACT (Latin, *Extractum Fluidum*).—The fluid extracts of the United States Pharmacopœia are preparations made by first extracting a vegetable drug with alcohol or diluted alcohol, then concentrating the resulting alcoholic solution by evaporation, and, unless the product be self-preserving, finally fortifying the same against decomposition by the addition of some appropriate preservative, generally glycerin. A further feature of the United States fluid extracts is the unique one of a fixed equivalent proportion between volume of product and weight of crude drug taken for the extracting, the equivalence being that between the units of volume and of weight of the metric system—so that, in short, each *cubic centimetre of fluid extract* represents the virtues of *one gram of crude drug*. Fluid extracts constitute a valuable class of medicinal forms, by reason of their concentration and keeping powers.

GLYCERITE (Latin, *Glyceritum*).—In the United States Pharmacopœia the title *glycerite* is given to a fluid preparation of which glycerin is the basis. Six glycerites are official.

HONEY (Latin, *Mel*).—There is but a single medicated "honey" in the United States Pharmacopœia, namely, *honey of rose*, a preparation consisting of clarified honey mixed with a little of the fluid extract of rose.

INFUSION (Latin, *Infusum*).—An *infusion* is a fluid preparation made by steeping a crude vegetable drug in water, cold or hot, and straining the product. Infusions, or "teas," as they are often called, are bulky, are generally ill-tasting, and also prone to decomposition. Except in the case of a few special infusions, viz., the infusions, respectively, of *cinchona*, *digitalis*, *wild cherry*, and *compound infusion of senna*, the United States Pharmacopœia contents itself with giving a general formula for the making of infusions, leaving the prescriber thus at liberty to order an infusion of any appropriate drug he may please. In such general formula the quantity of 50 gm. of crude drug, in coarse powder, is directed to be treated with 1,000 c.c. of boiling water, and the mixture to be set aside in a covered vessel for half an hour. The infusion is then to be strained, and enough water to be passed through the strainer to make the product finally measure 1,000 c.c. The Pharmacopœia enjoins the caution concerning infusions that "the strength of infusions of energetic or powerful substances should be specially prescribed by the physician." Of infusions generally, the average dose is from one to two fluid-ounces, but in the case of infusions of powerful drugs, as, for instance, infusion of *digitalis*, the dose may be very much less.

JUICE (Latin, *Succus*; unofficial).—In pharmaceutical

nomenclature the term *juice* signifies a preparation consisting of the expressed juice of a fresh vegetable drug, to which enough alcohol has been added to preserve from decomposition. Two such "juices" were made official in the United States Pharmacopœia of 1870, but were dismissed in the revision for 1880. "Juices" are faulty preparations by reason of uncertainty of strength.

LINIMENT (Latin, *Linimentum*).—A *liniment* is a fluid or semifluid preparation intended for rubbing upon the skin. The liniments of the United States Pharmacopœia are so incongruous as to present no class features for general discussion.

MASS (Latin, *Massa*).—A *mass* in pharmacy signifies a *pill mass*, and is applied, in the nomenclature of the United States Pharmacopœia, to the instances of pill masses where no subdivision into pills of definite weight is ordained. Such instances are three in number (mass of *copaiba*, mass of *carbonate of iron*, and mass of *mercury*).

MIXTURE (Latin, *Mistura*).—In the United States Pharmacopœia the title *mixture* applies to many incongruous mixtures affording *fluid* preparations. The word is properly restricted to such preparations as represent an insoluble substance in powder mechanically suspended in a viscid fluid menstruum. Such condition of suspension is often a convenient one for extemporaneous prescription of powders. In so prescribing, the necessary viscosity is to be obtained by the use of a mucilage, or of syrup, or glycerin, ordered in the proportion of from one part to one, to one part to three, of watery basis. In such viscid menstrua five per cent. of powdered extracts, or twenty per cent. of light vegetable powders, may be ordered to be suspended. Heavy metallic powders, as a rule, should not be prescribed in mechanical suspension.

MUCILAGE (Latin, *Mucilago*).—A *mucilage* is the well-known viscid product that results from treating a gum with water, hot or cold, as the case may be. Some mucilages are perfect, and others but partial, solutions. Four mucilages are official in the United States Pharmacopœia. They are all simply bland viscid preparations, devoid of medicinal activity.

OINTMENT (Latin, *Unguentum*).—An *ointment* is a preparation of fatty quality whose melting-point is so low that the substance liquefies, partially or wholly, at the temperature of the body. Ointments are intended for application to the skin, either for purposes of local dressing or to medicate constitutionally by the method of inunction. The common bases for ointments are *lard*, either plain or benzoinated; *lard* with a small admixture of *wax*, or the well-known substance *vaseline* ("petrolatum" of the United States Pharmacopœia). Under the simple title *Unguentum*, Ointment, the United States Pharmacopœia makes official a mixture of lard, four parts, and wax, one part. Such "ointment" is convenient, both as a simple ointment itself, or as a simple basis for extemporaneously medicated ointments. A number of medicated ointments are official in the United States Pharmacopœia, of which the basis, in the majority of instances, is benzoinated lard. For this, however, the prescriber may, at pleasure, direct vaseline to be substituted.

OLEATE (Latin, *Oleatum*).—In the United States Pharmacopœia the title *Oleatum*, "Oleate," is applied to three preparations, the "oleates," respectively, of mercury, zinc, and the alkaloid veratrine. These preparations consist of the oleates of the respective bases, dissolved in an excess of oleic acid. Besides these preparations, however, the oleates of many other bases, metallic and alkaloidal, are offered by pharmaceutical manufacturers, and are considerably used in medicine. Of these unofficial preparations some, like the official so-called "oleates," are solutions of oleates in excess of oleic acid; while others, such as the forms of oleate of zinc and of lead in common use, consist simply of the chemically pure *oleates* themselves. Preparations consisting of oleates in solution in excess of oleic acid, are oily fluids or soft unguents; while some pure metallic oleates, such as those of zinc and of lead, are dry pulverulent bodies of a smooth, soapy feel. Oleates owe their medicinal use to the fact that they per-

meate animal tissue with unusual facility, after the manner of oleic acid, and so are at once elegant and efficacious for skin medication. It is also commonly held that, upon inunction, oleates readily pass through the skin, enter the general circulation, and so affect the system at large, both promptly and thoroughly. Some doubt, however, is thrown upon this alleged faculty, by the failure of some clinicians to obtain mercurialization by inunction with oleate of mercury—and that, too, in the case of individuals who, upon trial, were found to be affected readily by ordinary mercurial ointment.

OLEORESIN (Latin, *Oleoresina*).—The *oleoresins* of the United States Pharmacopœia are preparations made by extracting with ether certain drugs whose medicinal activities reside jointly in oily and resinous constituents. After extraction the ether is evaporated and the oleoresin thereupon obtained in concentrated condition. The pharmacopœial oleoresins are thick fluids of concentrated medicinal strength. They are administered in capsule or emulsion.

PAPER (Latin, *Charta*).—Two medicated *papers* are official in the United States Pharmacopœia, viz., a paper of *mustard*, for local application, and a paper of *potassium nitrate*, for burning in order to get nitre fumes for inhalation.

PILLS (Latin, *Pillule*).—The *pill* is a favorite form for the administration of medicines, since in such form are combined the advantages of permanence, portability, exactitude of dosage, convenience of administration, and concealment of bad taste. The only drawbacks of the pill are comparative slowness of action as compared with powders or solutions, and the fact that many persons—all little children, namely, and also some adults—cannot swallow pills. The pill form is appropriate for any solid medicine which is not corrosive or deliquescent, and whose dose is within the weight of a few grains; and may even be employed in the case of certain fluids of small dosage such as croton oil. In order to be within bounds in the matter of size, pills, if composed of light substances, such as vegetable powders, should never exceed, individually, the weight of 20 cgm. (gr. v.), nor, if made up of heavy matters, such as metallic powders, the individual weight of from 40 to 45 cgm. (from gr. vi.-vij.). And pills are of most convenient size which do not weigh more than half such stated quantities. The proper *excipients* for pills will vary according to the nature of the basis ingredient of the pill. *Sticky vegetable extracts* need no excipient; such substances, indeed, constitute themselves excellent excipients for heavy powders. *Soft gum resins* also require no excipient, although in making such material into pills the addition of a few drops of alcohol may be necessary to reduce hardness. *Substances, fluid or semifluid*, acquire the proper consistency by admixture with some indifferent dry powder, such as pulverized starch or gum arabic. *Powders*, if heavy, are best treated by incorporation in some indifferent sticky vegetable extract, or in confection of rose; or, if light, by admixture of some viscid fluid, such as glycerin, syrup, or honey. Mucilage is unsuitable for such purpose because of its tendency to make the pill mass unduly hard when dry. For *resinous and fatty bodies*, soap makes a convenient excipient. In the prescription of extemporaneous pills it is commonly not necessary for the physician to specify the excipient—the selection of the appropriate substance being regarded as the function of the pharmacist. After being made, pills are variously *coated*. Shaking with an indifferent dry powder, such as lycopodium or liquorice powder, is the simplest procedure in such line, and suffices to prevent the pills from cohering, but does not conceal taste. For the latter purpose, if the pills have been freshly made, a convenient operation is the shaking of the pills in a box with silver or gold foil. By this manipulation the pills become covered with bits of foil which adhere fast enough to conceal taste during the act of swallowing, but which break away readily thereafter and so do not interfere with the solution of the pill in the stomach. By special processes, also, pills made by the wholesale are given