oil of yellow sandal-wood possesses properties analogous to those of copaiba. In doses of ɱx. to xxx. it imparts a peculiar odor to the urine and rapidly modifies the symptoms of catarrhal inflammation of the genito-urinary mucous membrane. According to Keyes, it is less effective in true gonorrhœa than in ordinary urethritis, though sometimes it rapidly diminishes the discharge and scalding. In excessive doses it is productive of severe irritation of the kidneys, marked by intense pain over the regions in which these organs are located.

The dose of sandalwood oil is from ɱx. to xx. It is usually administered in gelatin capsules, each containing ten drops, or in emulsion.

The following medicines stimulate the kidneys, but their diuretic action is not very decided, and hence they are not often employed in cases requiring an increase of the urinary secretion. They also exert a decided influence on the mucous membrane of the urinary passages, especially noticeable when a catarrhal state is present, as in pyelitis, cystitis, and urethritis. They are: chimaphila, buchu, uva ursi, pareira, petroselinum, taraxacum, erigeron canadense, carota, armoracia, and cantharis.

INDIRECT DIURETICS.—To this group of diuretics belong all medicines which modify the heart's action so as to increase the general arterial blood pressure. As the urine secreted during their action is copious and watery, they are often called hydragogue diuretics.

Digitalis.—In healthy persons digitalis exerts no obvious effect on the quantity of urine secreted, unless it be taken in excessive doses, or be too long continued, when the quantity becomes lessened. In cardiac dropsy it usually produces its action upon the kidneys as soon as the heart's action becomes slower and stronger, and the general blood pressure is increased. When the cardiac failure is so profound that digitalis cannot invigorate the ventricular contractions, it completely fails as a diuretic.

Digitalis is indicated as a diuretic in cardiac dropsy; that is, whenever an abnormal accumulation of serum in the areolar tissue, or in a serous cavity, is the result of inefficient heart action, and hence of general venous congestion. Digitalis is therefore applicable in the forms of dropsy due to valvular disease, degeneration of the hypertrophied heart, fatty heart, and dilatation of the right ventricle in consequence of chronic bronchitis and emphysema, or other pulmonary diseases.

Digitalis is always contraindicated when the pulse is strong and hard. In all cases it must be very cautiously given, as after some days, without having produced any obvious effects, it may suddenly act with unexpected severity. The cause of this cumulative action is not known. Schmiedeberg supposed it to be due to slow absorption and apparently slow elimination of its active principles. As a rule, its use should be interrupted as soon as the pulse has become slower and diuresis has increased. The following symptoms are regarded as cumulative effects, and their occurrence requires immediate discontinuance of the medicine: Decided slowness and irregularity of the pulse, nausea and vomiting, severe headache, dimness of sight, giddiness, sleeplessness, and delirium.

The initial dose of digitalis is gr. i. or gr. ij. three times daily. If it be necessary to repeat the dose every two or three hours, the patient should be visited twice daily.

Scilla.—Squill is a diuretic of very decided power, often in a few days greatly increasing the quantity of urine, when before it was very scanty. It is not, however, equally active in all forms of dropsy, manifesting little influence when the effusions are due to organic alterations of the kidneys or liver, or to inflammations of serous membranes.

Formerly it was held that squill acts directly on the secreting structures of the kidneys, since excessive doses were sometimes followed by strangury and bloody urine. But the experiments of Husemann on animals, in which toxic doses produced no marked changes of the kidneys, show that squill exerts a very slight, if any, direct influence. On the contrary, the recent investigations of Drouot, Jarmersted, and Husemann and Kŏnig render it certain that its diuretic action takes place in consequence of a modification of the heart's action. In its action upon the heart it closely resembles digitalis, influencing it, however, more rapidly and less durably. The slowing and strengthening of the pulse, which in man indicate an increase of the blood pressure, usually continue for only a few hours after ordinary doses.

The indications for the use of squill as a diuretic are the same as for digitalis. It is, perhaps, less efficient in cardiac dropsy than the latter remedy, but is often combined with it, as the combination acts more rapidly and effectually than either medicine alone.

Squill is often administered in the dropsy occurring in anæmic and cachectic patients, generally together with iron and quinine.

The dose of squill is from gr. i. to iij., administered from three to six times a day. In excessive doses it rapidly disorders the stomach, but never produces cumulative effects; hence it may be continued for a long time in moderate doses without risk.

Squill is generally supposed to be contraindicated in acute nephritis and in all forms of Bright's disease. There is, however, no evidence that it causes decided irritation of the kidneys. *Samuel Nickles.*

DIURETIN.—This name was given by Dr. Christian Gram, of Copenhagen, to the salicylate of theobromine and sodium which he introduced as a substitute for caffeine. Professor Schroeder, of Strasbourg, had experimented with the alkaloid theobromine, and had reported upon its important diuretic properties at the meeting of the German Medical Congress in 1889. He had found that caffeine in small doses often failed to produce diuresis, and when the vascular tension of the kidneys was increased, the flow of urine sometimes diminished on account of the increased blood pressure produced by the caffeine. Large doses overcame this effect, but they were liable to cause nervousness and insomnia, and other distressing symptoms. Theobromine he found to be an equally efficient diuretic without producing any nervous symptoms or affecting the blood pressure; chemically, it differed from caffeine by containing one equivalent less of methyl, it being the dimethyl-xanthin and caffeine the trimethyl-xanthin. The difficulty in using the alkaloid was its insolubility, it requiring 1,600 parts of water for its solution. At his suggestion Dr. Gram instituted a series of experiments, and succeeded in producing a soluble salt by combining it with salicylate of sodium. It is said to be prepared by dissolving one molecule (180) of theobromine in one molecule (40) of soda hydrate, and adding to the solution one molecule (160) of salicylate of sodium; when evaporated to dryness it should yield 362 parts of the double salt, which theoretically contains 49.7 per cent. of theobromine and 38.1 per cent. of salicylic acid. It is a white powder with a slightly bitter and disagreeable taste, very soluble; by the aid of heat it dissolves in less than half its weight of water, and no precipitation occurs upon cooling. Its solution is very unstable and rapidly decomposes. It burns without leaving any residue.

To estimate the amount of the alkaloid an aqueous solution is acidified, then made alkaline with ammonia, and the precipitated theobromine collected on a filter, washed, and dried. The amount of salicylic acid may be determined by treating the filtrate and washings with ether, separating the ethereal solution, and evaporating.

Theobromine exerts its diuretic properties by its direct action on the secreting tissue of the kidneys. It acts promptly and energetically, and its effect is maintained for a day or two after the withdrawal of the drug. Its action is not cumulative. The solids as well as the fluid are increased. It has a mild action on the circulation, very similar to that produced by caffeine; there is no marked change in the blood pressure, but the heart becomes slower, stronger, and less irregular. An improvement in the general condition of the patient is also experienced. Reports of its prolonged use show that it may be accompanied by heat and burning at the epigastrium, anorexia, diarrhœa and other signs of gastric and intestinal irritation. In all forms of dropsy due to renal disease its action is most efficient; there is no irritant effect on the secreting cells, and no unfavorable results follow its use. It is of service in all dropsies accompanying heart disease. When digitalis and other cardiac tonics have been used without success, diuretin will often be found to succeed, by its action on the kidneys following that of the other forms of diuretics. A combination of digitalis and diuretin will form a very active diuretic mixture in dropsies in which the blood pressure requires to be raised. It has not been found to be of so much value when the dropsy arises from inflamed serous membranes, or from hepatic disease. The following are the conclusions of Dr. Dujardin-Beaumetz:

(1) When given in doses of gr. xv. it is a much stronger diuretic than caffeine; (2) when there is considerable cardiac degeneration it should be used with some caution, especially when albuminuria is also present; (3) under its influence the cardiac contractions are scarcely affected; (4) diuretin rapidly increases the quantity of urine passed, and the diuretic effect lasts twice or three times as long as that produced by caffeine; (5) the activity does not wear off as the patient becomes accustomed to the drug; (6) micturition is not rendered difficult or painful; (7) diuretin has no action on the central nervous system.

The dose is from gr. lx. to xc. daily. It has been found most active in gr. xv. doses every two or three hours, in water with some aromatic essence to disguise its bitter taste. Care should be observed in selecting the remedy, on account of its instability. When exposed to the atmosphere it absorbs carbonic acid and separates the alkaloid, which is insoluble. The addition of acids or acid vegetable juice also decomposes the solution by throwing down the alkaloid. It has been found a safe remedy for children above one year of age, and has proved of marked benefit in scarlatinal nephritis. At the age of from two to five years the dose may be from gr. viij. to xxv. in the day, and at the age of from six to twelve, from gr. xxv. to xlv. The total amount for the day may be dissolved in four ounces of water with ten or twelve drops of brandy and a little sugar. It has been given for weeks without producing any ill effects and without any diminution of its therapeutic action.
Beaumont Small.

DIXIE SPRINGS.—Knox County, Tennessee.
POST-OFFICE.—Knoxville. Hotels in Knoxville.

The Dixie Mineral Spring is an artesian well, 185 feet deep, located just across the Tennessee River, now within the city limits of Knoxville. The location is on the northern slope of the foothills and about 1,000 feet above the sea level. The situation of the spring is a charming one and commands a magnificent view for miles up and down the beautiful Tennessee valley. The water was struck after boring 185 feet through solid rock. It has a temperature of about 58° F. the year round. The following analysis was made by J. W. Slocum, analytical chemist:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Calcium carbonate	14.90
Sodium chloride	110.35
Sodium sulphate	9.70
Sodium bicarbonate	146.91
Potassium nitrate	.60
Lithium chloride	Trace.
Magnesium carbonate	23.30
Magnesium chloride	.54
Magnesium sulphate	6.18
Iron carbonate	.60
Alumina	.30
Silica	.36
Total	313.74

This analysis shows a very valuable water of the alkaline-saline-muriated variety. It resembles the Vichy and Seltzer Springs of Saratoga, but contains less lime than those celebrated waters. This water has been found very useful in dyspepsia, biliousness, and constipation. The water has diuretic, laxative, antacid, and also mild tonic effects. It has an extensive sale in Tennessee and the adjoining States. *James K. Crook.*

DOCK.—RUMEX. "The root of *Rumex crispus* L. and of some other species of *Rumex* (fam. *Polygonaceæ*)" (U. S. P., but likely to be dropped from the forthcoming edition.) *R. crispus* is known as "Curly," *R. obtusifolius* as "Yellow" Dock. Both are pernicious perennial weeds from Europe, with long stout roots and tall wand-like stems, the greenish flowers and three-cornered, winged, reddish-brown fruits growing in dense, narrow, pyramidal panicles. Both have leaves a foot or two in length. Those of the yellow dock are broad, nearly plane and blunt. Those of curly dock are only two or three inches broad, tapering and acute, of a darker green and with the margin much crisped. The leaves, especially of the latter, are used as a well-known pot-herb, having laxative properties. Its root is also preferred to the other in domestic medicine and is narrowly fusiform, from six inches to nearly two feet in length and reaching something more than half an inch in thickness. It is little if at all branched, somewhat annulate above, deeply wrinkled below, deep reddish-brown without, whitish (if freshly within, and with reddish medullary rays, becoming brown throughout by long keeping. The fracture is short. It has a slight characteristic odor and a bitter, astringent, slightly mucilaginous taste. The root of the other is similar, but is not so long, and usually divides just below the surface of the ground into a number of more slender, parallel branches.

The important constituents are chrysophanic acid, tannin, and an amaroid, with starch and gum. The herbage especially contains much oxalic acid. The immediate effect of rumex may be either astringent or laxative, according to the conditions, usually the former. The fresher the root and the larger the dose, the more likely, usually, is the irritant chrysophanic acid to overcome the tannic acid and act as a laxative. It unquestionably exerts a beneficial tonic or alterative action, favoring the elimination of waste matter and stimulating both appetite and digestion. It produces, however, no striking effects and has fallen into contempt. The dose of the fluid extract is 2 to 8 c.c. (fl. ʒ ss.–ij.).
Henry H. Rusby.

DOGWOOD, FLOWERING.—CORNUS. The inner bark, preferably of the root, of *Cornus florida* L. (fam. *Cornaceæ*). The genus contains some thirty species distributed through the north temperate zone, a few getting into the tropics, in the mountains. They abound in bitter substances and tannin and act generally like the one here discussed. Several have been official, this being the last discarded. *C. florida* is a small tree, from twelve to thirty feet high, with slender, spreading branches, hard wood, ovate, pointed leaves, and very showy flower clusters. These are each supported by four large, broadly obovate and notched, white or purplish, petaloid bracts, which make the whole look like a large whitish flower; the real flowers, however, are minute, greenish-yellow, and closely aggregated in the midst of these bracts. Fruit clustered, small, scarlet, two-seeded drupes. It is common in the middle and southern portion of the United States, rarer and smaller in northern New England. When thrifty, it is very showy in blossom, and pretty also when the fruit is ripe.

Dogwood bark is in irregular flattish pieces, or in quills from 2 to 4 mm. thick (⅛ in.), and of varying length. Both surfaces and the texture are reddish, in the stem bark rather dull, in the root bark a deep crimson purple. The outer surface is smoothish; the inner finely but prominently reticulate striate, and hard to the touch, almost like fine sand paper; the fracture is short and brittle; the texture hard. Taste, bitter and astringent; odor, none. Dogwood is exclusively an American remedy.

It contains the amaroid *cornin*, in white, silky, very bitter crystals, soluble in alcohol and water. *Tannic acid,*

sugar, *fatty oil*, and *resin* are among the other constituents. The cornin and the tannin are its active principles. Cornin has been used as a substitute for and an adulterant of quinine.

Action and Use.—There is no reason to suppose that this medicine is anything more than a slightly astringent, bitter tonic; as such, however, it is good and useful. It was one of the drugs proposed as a substitute for cinchona in the treatment of intermittents, and, like them all, has been completely set aside by the general use of quinine. The fluid extract is given in doses of 1 to 4 c.c. (ɱxv. to lx.), but the use of the tincture is preferable.

Henry H. Rusby.

DOGWOOD, JAMAICA.—Piscidia. The bark, preferably of the root, of *Ichthyomethia Piscipula* (L.) Kuntze (*Erythrina Piscipula* L.; *Piscidia Erythrina* Jacq.) (fam. *Leguminosæ*), a large West Indian tree yielding a valuable wood. Its use as a fish poison is ancient. It is crushed and prepared, then dragged through the water in baskets, the fish being quickly narcotized and then easily caught. It has also had for a long time a local reputation for relieving pain, especially toothache, which was treated by applying it, or some preparation of it, locally, in the carious cavity. In this country it has been used for various conditions, generally including pain of so-called nervous character, with uncertain, but on the whole favorable, results. Judging from the published reports, it has been more used in the Western and Southern States than in the East.

The drug occurs for the most part in strips, from six inches to two feet long and up to six inches in breadth. These strips are usually more or less curved, the smaller ones sometimes quilled, the larger sometimes flat, but warped. The thickness of the bark varies from one-twelfth to one-fourth inch. The bark of the root is in shorter and smaller pieces, more irregularly curved, and less fibrous and tough. It is grayish or yellowish-brown and often mottled externally, dark brown and fibrous next the wood, frequently with large patches looking as though stained of a bluish-green. Upon fracture, the central tissue is seen to be dark green. Odor narcotic; taste disagreeable, acrid.

It contains resin, the crystalline amaroid *piscidin* ($C_{29}H_{24}O_8$), soluble in hot alcohol, and a water-soluble glucoside which is apparently the fish-stupefying agent. The "piscidin" of the market is not a chemical body but merely a resinous extract.

Jamaica dogwood appears to have decided narcotic powers over most animals, it certainly does in a marked degree upon fish, as its original use shows, and in case of frogs and several kinds of higher animals it exhibits the same qualities. The following summary is from experiments by A. C. Nagle: "It is a narcotic to higher as well as lower animals. It dilates the pupil, it causes an increase in the respiration, followed by a sudden decrease; produces salivation and profound diaphoresis; reduces the action of the heart, producing general paralysis and death by asphyxia. It has little effect upon the temperature." In therapeutics it has been tried with good results in neuralgia, headache, hysteria, "phantom tumor," "nervousness," melancholia, prodromic labor pains, neurasthenic pains of various places, etc., as well as for some inflammatory pains, such as those of iritis. It also serves a good purpose as a hypnotic in restlessness, alcoholic wakefulness, etc. For certainty and uniformity of action it is not to be compared with opium or chloral, and disagreeable feelings sometimes follow its administration, as well as that of these more powerful drugs. The fluid extract is usually given in doses of 2–4 c.c. (fl. ʒ ss.–i.).

Henry H. Rusby.

DOGWOOD, POISON. See Rhus, under *Poisonous Plants*.

DOLOMOL is a mixture of the stearates and palmitates of calcium and magnesium. On account of its smooth texture and neutral character, it is recommended as a dusting powder for the skin. It may be used alone or mixed with boric acid, calomel, resorcin, sulphur, etc. With sodium bicarbonate it forms a soothing application to superficial burns.

W. A. Bastedo.

DOLORES.—Nuevo Leon, Mexico.

About 40 km. to the south of Linares, on the Fresno estate, is found a sulphur spring called Dolores. This spring has been classified as a sulphureted lime spring, the water is quite cold, and sometimes during very dry seasons the spring runs dry. In spite of this drawback the curative properties of the water are so well known that large numbers of people are attracted to the place in the hope of relieving rheumatic ailments and diseases of the skin.

No quantitative analysis has as yet been made of this water; we only know that it contains a large quantity of sulphurous acid.

N. J. Ponce de Léon.

DOSAGE.—Under this title will be discussed the principles that determine standard dosage, and the circumstances that necessitate modification of such dosage.

1. Standard Dosage.—The word *dose*, in connection with the matter of the administration of medicines, is used in two distinct senses, which must carefully be discriminated, as follows: In one sense the dose of a medicine may be taken to mean the quantity necessary to produce a certain therapeutic effect for the time being, and in another acceptation the same word signifies the quantity to be administered in a single portion. Very frequently the two doses, in these two senses, are identical—the quantity necessary for an effect being given all at once—but very often again they are not. Thus gr. xx. of quinine—a *dose* of that medicine for an antipyretic effect—may be *administered* in four individual *doses* of gr. v. each, taken at short intervals.

Dose, in the sense of quantity necessary for a given effect, is, of course, determined by trial. In stating doses in this sense, the point must be regarded whether the effect sought is to be a passing one only or a continuous one. In the former case the dose can categorically be stated, as, for instance, that the purgative dose of castor oil is a tablespoonful; but in the instance of a continuous effect such categorical statement is impossible, since dose now refers to the quantity necessary to be present in the blood at any single moment. Dose, in such case, must be stated in terms of the amount required to be given within a certain period for the maintenance of the necessary impregnation of the system. In such statement the period most convenient, and therefore most commonly used, is the term of twenty-four hours. So, for instance, we say that the dose of a bromide as a single sleeping draught is simply so much; but we state the dose of the same medicine for the controlling of epilepsy at *so much a day*, since now a certain grade of bromism must be maintained unremittingly for months or even years.

Standard dosage never can be set at a precise figure; in the first place, because therapeutic achievements do not permit of precise mensuration, and, secondly, because the factors that determine degree of medicinal effect are many and impossible of exact estimate. All posological tables, therefore, must be taken to exhibit only averages. Individual medicines may have more than one standard dosage if they subserve different purposes attained by different dosage. Thus quinine has one dose as a simple bitter stomachic, but another and quite different one as an antipyretic.

Dose, in the sense of *amount to be administered in one portion*, is, of course, based primarily on dose in the foregoing sense, but is also affected by other considerations. In cases in which a transient effect only is wanted, the rule is to give the whole dose at once, unless there be positive disadvantage in so doing; and that practically means unless the whole dose, swallowed in single portion, would be likely to disorder the stomach. In such case the charge is given, as the phrase is, in *divided doses*; that is, in moieties administered in even succession at intervals long

enough to save the stomach, but short enough to secure the practical presence of the whole charge in the blood at once.

In cases in which the medicinal impression is to be continuous, the daily allowance is to be given in such division of dosage as will best harmonize the conflicting considerations of maintaining an equable impression on the one hand, and avoiding an undue disturbance of the patient on the other. For the one consideration calls for administration by frequent small moieties, and the other, on the contrary, for the minimum of frequency. Practically, the rule is to dose no oftener than necessary for the maintaining of a fairly equable impression, and to reduce this frequency still further if it disturbs the patient, or his stomach, unduly. The amount of each dose will be determined by the frequency. In following out this rule, the first thing to find with a given medicine is that minimum of frequency of giving which will attain a practical equability of effect. This minimum will differ enormously with different drugs—a fact often not properly recognized,—being determined by the relation between rate of absorption and elimination, a rate which varies greatly among medicines. In a general way, compounds of the heavy metals are slow of elimination, whence follows the fact that a mercurial impression is practically equable with a renewal of doses, by the mouth, of no greater frequency than thrice daily, or, by inunction or fumigation, once daily; and, similarly, that tonic doses of iron hardly require more frequent giving than three times a day. Salts of the alkalies of high diffusion power, however, are much more rapidly eliminated; so that to maintain an equable effect with them the daily allowance, in continuous medication, should be broken up into four charges at least, and a distribution into six may in many cases be distinctly advantageous. The alkaline iodides and bromides are prominent examples of this class of medicines, and the best therapeutic effects of these salts are often missed through the error of giving at too long intervals. Diffusible alcohols and ethers must be given more frequently still, if the effect is to be maintained with any approach to equability, and the same is true also of many neurotic alkaloids. A prominent example in point among alkaloids is aconite, which, given for the purpose of reducing heart action, should be administered at least hourly, the amount given on each occasion, of course, bearing proper relation to the frequency.

The second consideration is so to grade the frequency that the individual doses will be small enough not to derange the stomach, nor, constitutionally, to produce an initial over-great effect. Here again the importance of the consideration is often overlooked by prescribers, and a patient is unnecessarily sickened, or his functions are unduly perturbed, by large infrequent dosage, when precisely the same therapeutic effect from the medicine could have been gotten without distress or without derangement by the same dosage broken up into more frequent, and hence smaller, individual charges.

But while there is, thus, an advantage in dosing, for continuous impression, by the method of "little and often," yet the consideration of the disturbing of the patient forbids the carrying of the method to extremes. This consideration is serious in cases of slight indisposition on the one hand, and of desperate illness on the other. In the one case the patient, not too sick to attend to his ordinary avocations, is intolerably annoyed by an over-frequent dosing, and in the other the subject, ill nearly unto death, and needing the most careful nursing of his fast-ebbing vitality, is likely to have his life literally worried out of him by incessant wakings and liftings to swallow medicine.

An important factor affecting standard dosage—whether dose for a transient or a continuous effect—is the *bulk* of the subject, since obviously, for constitutional effect of constant degree, the amount of drug must be proportioned to the amount of blood in which the drug is to be dissolved. This consideration obtains especially in prescribing for children. To meet the case of the necessary scaling of doses to fit the varying bulks of this class of patients, several formulæ have been devised, of which the two in commonest use—Young's and Cowling's—work by the *age* of the subject, on the presumption—true enough for the purpose in hand—that children of a given age are of a given bulk. Young's rule is that, taking the adult dose at unity, the fraction thereof proper for a child of given age is expressed by the formula $\frac{\text{age}}{\text{age} + 12}$. At age six, for instance, the fraction is $\frac{6}{6+12} = \frac{6}{18} = \frac{1}{3}$, *i.e.*, a child six years old should be given one-third of the dose proper for an adult. Cowling's formula is, under the same premises, $\frac{\text{age at next birthday}}{24}$. At age six, by this formula, the proper fraction of the adult dose is $\frac{7}{24} =$ a little less than $\frac{1}{3}$. In general, with the younger ages, Cowling's formula yields a slightly smaller dosage than Young's. A formula much less used, because of its inconvenience, is Clarke's, wherein actual weight, instead of age, determines the dose. In this formula, standard dose being unity, the dose for a subject of given weight is expressed by a fraction of which the numerator is the number corresponding to the weight in avoirdupois pounds, and the denominator is the arbitrary number 150, corresponding to the weight, in pounds, of the average human adult.

2. Circumstances Necessitating Modification of Standard Dosage.—These circumstances, which are many and potent, are as follows: *Age*, apart from the consideration of bulk of subject, calls for special adjustment of dose in the case of many medicines. In general, children are more susceptible to drug influence than adults, and this fact obtains strikingly in the instance of opium. In general, furthermore, both extremes of age bear actively perturbing medication badly. *Sex* is another element to be considered in adjusting dosage—women, bulk for bulk, being generally more susceptible to medicines than men, and particularly so as regards neurotic drugs. *Climate* also must be regarded, with especial reference to the fact that in warm weather the digestive system is unduly sensitive, and the system generally more susceptible to depressing influences. *Custom* may affect dosage powerfully, sometimes by enhancing, but more commonly by lessening, normal effects. This lessening is seen markedly in the case of the strictly neurotic effects of so-called neurotic drugs, such as opium or alcohol, although with this same class of drugs—a fact often overlooked—the effects *other* than neurotic may be wholly uninfluenced, or even enhanced in intensity, by habit. Thus, for instance, appears the curious anomaly in the case of the confirmed toper that with ever-increasing indulgence he gets not any more *drunk* than before, in the commonly understood sense of the word, but yet *does* get progressively more and more catarrhal as to his stomach and bowels, more cirrhotic as to his liver, more apoplectic as to his brain, and more debased as to his memory, manners, and morals, with every drop added to his daily allowance of liquor. *Idiosyncrasy* is another important factor in dosage, working now to increase, and now to lessen, the standard; and, lastly, *physiological status* must be regarded, since, in practice, morbid conditions may modify profoundly normal susceptibility to medicinal influences. A notable instance of this circumstance is, once more, in the case of neurotic drugs, which, in conditions of great devitalization, require very much larger doses than normal to produce normal grades of effect. Thus a subject at death's door from a sudden voluminous loss of blood may swallow doses of opium or of brandy that would actually be fatal in health, but now with no other effect than to sustain the failing heart and nervous system until natural recuperation begins. In actual prescribing, therefore, particularly of neurotic drugs, the wise physician regards posological tables as furnishing points of departure, only, for the increase or diminution of standard dosage according to the condition of the patient.

From all the foregoing two corollaries appear, of obvious practical importance—the one that dosage for a given drug cannot be set at one categorical figure; and the other that, even with given conditions, dosage never can be estimated with any approach to precision.

Edward Curtis.

DOUBLE MONSTERS. See *Teratology.*

DOXTATTER'S MINERAL WELL.—Monroe County, New York.

POST-OFFICE.—Rochester. Hotels.

This well is described in some of the older works as Longmuir's Well. It is located in the city of Rochester. An analysis by L. C. Beck, many years ago (1842), resulted as follows:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Calcium bicarbonate, Magnesium carbonate, Iron oxide	11.84
Sodium sulphate	55.92
Calcium chloride	52.16
Total ingredients	119.92

Gases.	Cubic inches
Sulphureted hydrogen	17.28
Carbonic acid	Trace.

This analysis is evidently incomplete. It shows sufficient sulphate of soda to give it aperient properties. The water is also highly charged with sulphureted hydrogen.

James K. Crook.

DRACONTIUM. See *Skunk Cabbage.*

DRACUNCULUS MEDINENSIS. See *Nematodes.*

DRAGON'S BLOOD.—RESINA DRACONIS (*Sang dragon*, Codex Med.). A deep-red resin which exudes spontaneously from the ripe fruits of *Calamus Draco* Willd. (fam. *Palmaceæ*), one of the rattan palms of Borneo, Java, and other Polynesian islands. It is collected by shaking the ripe fruits in a basket, sifting out the resin and, by means of warmth, moulding it into little balls, or more usually into slender sticks, 20 or 30 cm. long and about as thick as the finger. These are wrapped in pieces of leaves and tied. Inferior qualities are made by boiling out the resin from the fruits, and hardening it in masses. Large, brilliant red cakes should be looked upon with suspicion, as they are apt to be heavily adulterated.

Dragon's blood is in mass a brown-black, brittle resin, of no odor, and of a sweetish, afterward slightly acrid taste. It breaks with a reddish fracture, and is translucent in thin layers. It is entirely soluble in alcohol, chloroform, carbon disulphide, etc., with the exception of from ten per cent. upward of vegetable tissue and other impurities. It softens and becomes sticky by the warmth of the hand, and at a higher temperature is partly decomposed, liberating among other things benzoic acid.

It is extensively used in coloring wood stains, varnishes, etc., but has no peculiar medical properties. Its only use in pharmacy is as a harmless coloring matter for tooth powders, ointments, and similar pharmaceutical mixtures.

W. P. Bolles.

DRESSINGS, SURGICAL.—The history of surgical dressings is similar to that of drugs in one particular, namely, that their preparation has been gradually transferred from the doctor's office to a factory especially equipped for the purpose. Many articles formerly used on account of their absorbent properties, such as peat, moss, sawdust, etc., are now entirely unknown among younger surgeons. Similarly the increased use of plaster-of-Paris bandages has rendered obsolete many complicated forms of splint.

The materials at present used in surgery during operations, and for dressings, will be considered under the following heads: Sutures and Ligatures, Drains, Absorbent Materials, Bandages, Plasters, Splints, Lubricants. A brief consideration of Handkerchief Dressings, and the Application of Plaster of Paris will close the article.

Sutures and Ligatures.—Some of the materials ordinarily used for ligatures or sutures are absorbable in the tissues, and some are non-absorbable. This distinction is of the first importance in the selection of a suture or a ligature. Thus, for the suture of a broken bone or to close a ventral hernia, one would not select a material which would be absorbed in a week. On the other hand, many surgeons object to the use, even in these situations, of material which can never be absorbed.

The length of time during which different materials may be expected to withstand disintegration in the tissues of the body may be roughly stated as follows: fine catgut, from two to four days; coarse catgut, from five to seven days; animal tendon, from three to ten days. Catgut or animal tendon which has been immersed twenty-four hours in a solution of bichromate of potassium will resist disintegration for from four to six weeks. Fine or coarse silk, silkworm gut, horsehair, and silver wire will never be absorbed.

Surgical catgut is made of the small intestine of the sheep and other animals, washed to free it from dirt, soaked in ether to free it from fat, and then sterilized. For use it is preserved either dry or in alcohol, or in some antiseptic solution. It is sold in various sizes, from 00 up to 10 (Fig. 1656), though the very large sizes are seldom used.

The sterilization of raw catgut has presented many difficulties. If boiled in water it turns to jelly. Its sterilization by steam is for the same reason impracticable. If sterilized by dry heat the temperature may reach 150° C. without injury to the catgut, provided that every particle of moisture be first removed from the gut. A special apparatus is therefore required, and the sterilization by dry heat is not sufficiently certain to warrant the general adoption of this method.

If catgut is soaked in a solution of formaldehyde gas, formalin as it is called, from one to twelve hours, according to the size of the gut, the albumen will be so altered as to permit the catgut to be boiled in water for a time without injury. This method of sterilization presents the difficulty, however, that the gut must be kept tightly stretched, and that the strands shall not overlap either during the soaking in formalin or the boiling in water. Various kinds of racks have been devised to accomplish this end. One of the simplest plans is thus described by Fredrick: Wind the gut in a single layer on a glass spool, in either end of which a notch has been filed. Pass one end of the catgut through the spool and tie tightly to the other end of the catgut. Drop the spool into a three-per-cent. formaldehyde solution. Leave it in the solution a longer or shorter time, according to the size of the gut, as follows: No. 00, three hours; No. 1, three hours; No. 2, five hours; No. 3, seven hours, etc. Wash in running water, boil fifteen minutes, and keep in sterilized bottles in ninety-per-cent. alcohol containing eight per cent. glycerin. The glycerin should be sterilized by heating in a water bath before it is added to the alcohol. If a spool of catgut is partly used, tie the ends of the catgut together, drop the spool into boiling water, and place it in a sterile bottle as before. Catgut so prepared will resist absorption a week or ten days.

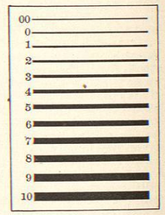

FIG. 1656.—Sizes of Ligatures.

Catgut may be sterilized by soaking it in antiseptic solutions. A great number of formulæ have been proposed. The catgut can either be used from the antiseptic solution or it can be removed from it after it has lain in it a certain number of hours, and be preserved for use in alcohol. A good example of this method is the following: Wash the catgut in ether and soak it for from one-half hour to two hours, according to the size of the gut, in ten-per-cent. solution of carbolic acid in alcohol. Keep until wanted in alcohol. The objection to this method is its uncertainty. No matter what antiseptic is employed, one can never be sure that it has penetrated the gut in every part. Moreover, some antiseptics weaken the gut, and if not removed from it they may prove injurious to the tissues of the patient.

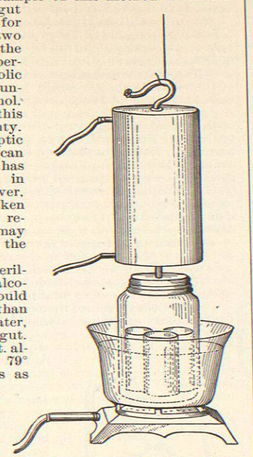
FIG. 1657.—Apparatus for Boiling Catgut in Alcohol.

Catgut may be sterilized by boiling in alcohol. The alcohol should not contain more than five per cent. of water, lest it weaken the gut. Ninety-five-per-cent. alcohol boils at about 79° C., and hence germs as well as spores may not be killed by this process if it is continued for only a short time. Moreover, the alcohol evaporates so rapidly that it is necessary to add fresh alcohol every few minutes. This is expensive, and the fresh, cool alcohol continually reduces the temperature and gradually increases the percentage of water. These difficulties can be avoided by using a small still (Fig. 1657).

With the apparatus above pictured one can prepare quickly and easily a gut which will yield good results in minor surgical work. It cannot be recommended for major surgery, however, for there is always a possibility that the ligature is not sterile.

Catgut may be boiled in alcohol under pressure. In this way a temperature of 90° C. can be maintained for one hour without injury to the gut. Gut so treated will be sterilized absolutely. Such apparatus is costly, and will scarcely be found outside of hospitals and manufactories of surgical supplies.

Catgut may be absolutely sterilized by boiling in some substance whose boiling point is high and which will not injure the gut. Oil of juniper was once much used for the purpose, but it makes the gut very springy, almost like wire, and if boiled too long the gut becomes brittle. Cumol is one of the best substances for this purpose. It is oily, boils at about 155° C., and does not injure the gut. When ligatures have been sterilized in this manner they may be placed in alcohol for use, sealed up in tubes if desired, or first placed in germ-proof envelopes when the ligatures and envelopes can be sterilized together.

The following description is interesting as showing the number of steps which are taken in the preparation of aseptic ligatures by one of the well-known manufacturers:

1. Exterior cleansing by scrubbing.
2. Removal of moisture.
3. Sealing in envelopes made of toughened filter paper.
4. Successive percolations with solvents (naphtha, ether, benzol, alcohol, etc.).
5. Sterilization by boiling in a solution of cumol compound at a temperature of from 160° to 170° C.
6. Removal of cumol solution by heat.
7. Final sealing in an aseptic outer envelope and transference to outer container.

A somewhat simpler method is followed in the Johns Hopkins Hospital, but numerous bacteriological tests have proved it absolutely reliable. The steps of the sterilization are: 1. Roll the catgut, twelve strands in a figure-of-eight form, so that it can be slipped into a large test tube. 2. Bring the catgut up to a temperature of 80° C. and keep it at that point for an hour. 3. Place the catgut in cumol which must not be above a temperature of 100° C. Then raise it to 165° C., and hold it at that point for one hour. Pour off the cumol, and allow the heat of a sand bath to dry the catgut, or dry it in an oven at a temperature of 100° C. for two hours. 5. Transfer the ring of gut with sterile forceps to a test tube previously sterilized as in the laboratory. In drying and boiling, the catgut must not touch the vessel. It is therefore suspended on wires, or rests on absorbent cotton.

FIG. 1658.—Sterilized Catgut in Bottle, Ready for Use.

To close hernial openings, and under other circumstances, a suture is needed which will resist absorption longer than plain catgut. This need led to a search through the animal kingdom for other suture material. By far the best is the tendon of the kangaroo's tail. This large, strong tendon, when dry, falls naturally into a loose bundle of separate round cords, each about the size of very heavy catgut. These naturally separate fibres are easily obtained a foot or more in length. The large tendons of the kangaroo's leg are also made up of bundles of fibres, but the separation of the individual cords is not so perfect as in the tail tendon, and the cords, or many of them, are so large as to require splitting. These split threads from the legs are not so desirable as the naturally rounded ones from the tail. Other animal tendons are split into threads and used, but they are far inferior in appearance to the ligatures made of kangaroo tendon.

These animal tendons have a varying resisting power, and the source of supply in the case of the kangaroo is limited. Hence the need of increasing the durability of catgut by chemical means. This is done by soaking the gut in a watery solution of bichromate of potassium. The strength of the solution and the number of hours the gut soaks in it form a rough means of telling how long the suture material will resist disintegration. Thus, one speaks of eight-day catgut, fourteen-day catgut, etc., meaning catgut which has been so treated that it is expected to resist disintegration for so many days. It is only fair to state that clinical results are not so uniform as the laboratory tests, and those who have had occasion

FIG. 1659.—Sterilized Catgut in Sealed Glass Tube.

to reopen wounds at the end of a few days have sometimes found that chromicized catgut intended to last several weeks has fallen to pieces in as many days.

A well-tried formula for making chromicized catgut is as follows: 3 parts of bichromate of potassium, and 20 parts of glycerin and carbolic acid, are dissolved in 2,000 parts of water. In this solution the gut is soaked for