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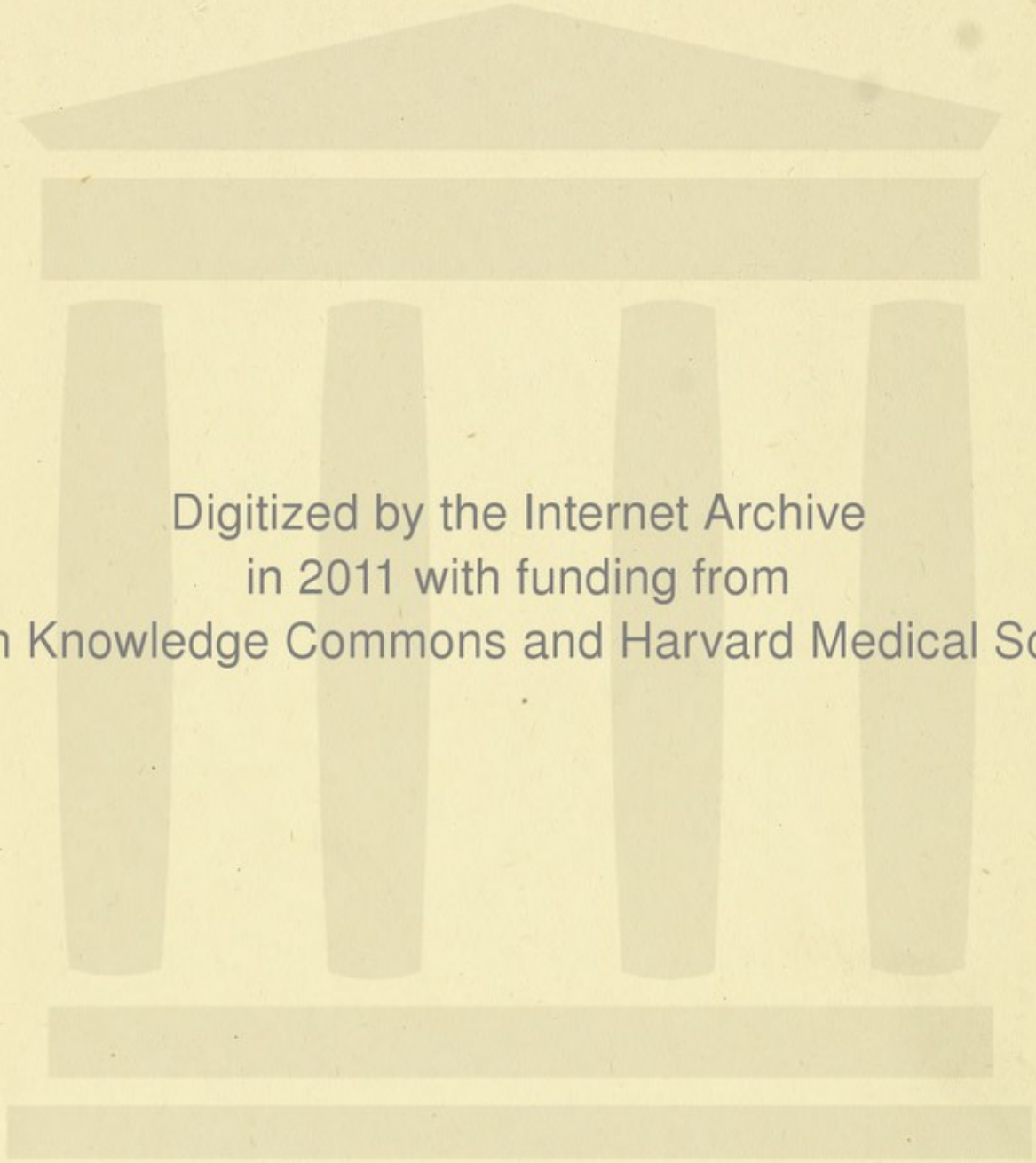
Hypodermic Medication.

By Bourneville & Bricon.



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DRS. BOURNEVILLE AND BRICON'S

MANUAL OF

HYPODERMIC MEDICATION.

BY

G. ARCHIE STOCKWELL, M. D., F. Z. S.
(Member of New Sydenham Society, London.)

1890.
GEORGE S. DAVIS.
DETROIT, MICH.

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PREFACE.

The *Manuel des Injections Sous-cutanées* of Drs. Bourneville and Bricon has achieved such notable success on the Continent and in Great Britain, that no apology is required in introducing a modification thereof to cis-Atlantic practitioners, especially as there are no works in the English language devoted to this subject at present available. With the exception of Bartholow's *Manual*, out of print since 1884, and Eulenburg's essay in Ziemssen's *Handbook of Therapeutics*, nothing has been published in this country within recent years.

This work possesses the advantage of being very complete, well up to date, and above all, of pointing out certain disadvantages that are liable to accrue from practice of this branch of therapeutics.

It is with sincere pleasure I acknowledge my indebtedness to Dr. Andrew S. Currie, of Moorlands, Sidney, Gloucestershire, England, whose English publication has made my own work simple and easy. *Moreover, the additions and emendations of this gentlemen are in many instances the most valuable paragraphs in the book.*

The work has been almost entirely re-written, as it seemed advisable to omit a considerable portion of original matter that was either irrevelant or repetitious, and also the reference notes, which are largely superfluous now that nearly every public library possesses files of the *Index Medicus*, that afford more complete reference. The formulæ too, where it seemed advisable and no way modified the context, have oftentimes been changed to meet the requirements of American practitioners. who for the most part employ decimal measures; further, 5 and multiples of 5, are more easily calculated and employed than the multiples of such figures as 4, 6, and 8.

Trusting the volume will prove as valuable and interesting to the reader as it has to the editor and revisor, I remain, sincerely,

G. ARCHIE STOCKWELL.

Detroit, Mich., August 1st, 1890.

INTRODUCTION.

HISTORY, VALUE AND METHODS.

The introduction of a needle into the body as a therapeutic measure, has been in vogue for centuries in the Orient, and was introduced into Great Britain and Europe in 1670, though it met with little favor until 1810, when Berloz revamped the procedure. Intravenous injections generally obtained in the 17th century, but whether a *hollow needle* bearing medicaments was ever employed for remedial purposes, is questionable. Endermic medication, however, was taught by Lambert; "Inoculation of Remedies," by Lafargue, in the early part of the present century; and Valleix attempted the introduction of medicines into the cellular tissue by acupuncture.

For the strictly hypodermic method, however, aside from the physiological experiments of Magendie and others, we are indebted to Doctor Alexander Wood, of Edinburgh, Scotland, who employed morphia solutions subcutaneously for the relief of neuralgia as far back as 1843, though such procedure attracted little attention until about 1855. Priority has been claimed for Langenbeck, Rynd, Kurzak, J. Taylor, and others, but has never been satisfactorily substantiated. Rynd wrote of it in 1845, but there is little doubt his information was derived from Dr. Wood. No small portion of our present knowledge, moreover, is due to Mr. Charles Hunter and Doctor An-

stie, the former of whom became the sponsor of the method, deriving the name from *υπω* (under) and *δερμα* (the skin).

Since 1855–56 when the hypodermic method was introduced into America by Doctor Fordyce Barker, and an impetus given thereto by Ruppaner who employed the methods of Valleix, the recorded experience of a large number of trustworthy observers throughout the civilized world has raised to the rank it at present justly holds. Its popularity also is in some measure due to the Commission appointed by the Royal Medico-Chirurgical Society of Great Britain, in 1867, who reported as follows:

1. That as a general rule only *clear neutral solutions* should be injected, for such solutions rarely produce local irritation.

2. That whether the drugs be injected under the skin or administered by the mouth or rectum, their chief physiological and therapeutical effects are the same *in kind*, though varying in *degree*.

3. That symptoms are observed to follow the subcutaneous injection of some drugs, which are absent when the same are administered by other methods; and on the other hand certain unpleasant symptoms which are apt to follow the introduction of the drugs by mouth and rectum, are not usually experienced when such are injected under the skin.

4. That, as a general rule,—to which, however, there may be exceptions,—clear neutral solutions of drugs introduced subcutaneously are more intense in their effect than when introduced by the rectum or mouth.

5. That no difference has been observed in the effects of a drug subcutaneously injected, whether it be introduced near to, or at a distance from, the part affected.*

6. That the advantages to be derived from this method of introducing drugs, are: *a.* Rapidity of action: *b.* Intensity of effect: *c.* Economy of material: *d.* Certainty of action: *e.* Facility of introduction in certain cases: *f.* With some drugs the avoidance of unpleasant symptoms.

7. This plan, therefore, is especially adapted to those occasions when very rapid and decided effects are required from drugs that are operative in small doses.

SOLUTIONS.

With regard to the safety of hypodermic procedures, there are no dangers providing due caution is exercised, backed by thorough knowledge of the physiological manifestations of the materials employed, and of the chemical compounds that may

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* Messrs. Eulenberg and Davis, deriving their ideas from Lambert, hold absorption is more rapid in certain situations than others. For instance: Most rapid when introduced in the temples or cheeks; next, in the epigastrium; third, in the anterior portion of the thorax; fourth, in inner aspect of arm and thigh; fifth, in the nape; sixth, external aspect of arm and thigh; seventh, in forearm; and eighth, *nil* in the foot and back.

The absurdity of this is self-obvious. Since all injections obtain their effect by absorption into the circulation, it is evident the differences that may arise from locality are practically inappreciable.—Ed.]

be induced in the solutions by keeping, by the effects of exposure to air, by sunlight, etc. Again, it must be remembered that the physiological activity of nearly all drugs, more especially narcotics and those that possess direct action upon the great nerve centers, is from three to five times more active when administered hypodermically, than when given by the mouth; likewise, that the liquid injected must not be markedly acid nor deeply alkaline, nor in any way obviously irritant to tissue.

It is a mistake, however, to suppose that it is always absolutely indispensable that a solution should be strictly neutral; it is merely desirable it should be *as nearly so as possible.* In fact, we are often obliged to have recourse to acid solutions, which, unfortunately, as a rule, are more or less painful; but it may be observed that suffering is not generally proportionate to the acidity of the solutions—thus, quinine in tartaric acid is more painful than in sulphuric or hydrochloric acid, although the acidity of both the latter is more intense. Again, the mere fact a solution is neutral, is not evidence also that it is non-irritating.

The degree of concentration is also to be considered. In regard to substances of very active properties, this is of minor importance; but we are precluded from employing most substances hypodermically, because the bulk demanded for a dose is too great; because the solubility is too slight to permit of being

used in sufficient doses; or because the remedy in the necessary degree of concentration is highly irritating.

In selecting a solvent, the question of *result* is imperative. As far as possible, all injections are best made fresh, and, when permissible, camphor-, or chloroform-waters prove the best vehicles, providing it is not a question of alterative injection. Solutions in equal proportions of glycerin and water are frequently well borne by the tissues, but not always desirable owing to the caustic action of the former; and other solvents and vehicles may also be satisfactorily employed, such as distilled water, cherry-laurel water, ether, alcohol, oils, etc.; and when a preparation is to be kept for any length of time, it is often advantageous to add chloral, carbolic acid, boric acid, or some other material that will secure its preservation.

Accidents may arise from deposits or fungi; crystals may appear in a too concentrated solution, having either existed from the first, or subsequently developed; or the medicine itself may be at fault, especially if it is held in suspension instead of solution—as in the case of calomel—or if it is but moderately capable of absorption. Finally, as far as possible, it is best to inject fluids at a temperature near that of the body, or about 98° F.

INJECTIONS.

The best mode of making the injection is that laid down by Mr. Charles Hunter, viz: "To pick up

a fold of loose skin and push the needle through until the point works loosely in the subdermic cellular space;" then to inject steadily, but as quickly as possible, placing the finger for a moment on the opening after the withdrawal in order to prevent the oozing of the final drop that tends to follow the needle. There is no need for a plaster or anything of the sort over the puncture.

An adept will hold the syringe barrel between the fingers with the head of the piston pressed against the ball of the palm, and by an adroit movement insert the needle and solution by one instantaneous movement as it were, the whole procedure occupying less than two seconds of time. This is the writer's method, and is so rapid that even children find no cause for complaint, especially as a platinum cannula as fine, almost, as a cambric needle is employed.

Formerly it was taught to inject slowly, with two or three pauses of a second or two, but this is unnecessary (and withal oftentimes most painful) unless the amount employed is considerably in excess of fifteen or twenty minims.

If the operator be expert, and his needles suitable, there need be no pain worthy of mention; it is only by carelessness that a needle is badly inserted,—transfixes a nerve or vein, or enters connective tissue. Slight hæmorrhage, a drop or two, is of no moment; and the same in the main holds true when a small blood-vessel is transfixed, if the fluid is free from turbidity and

non-irritating; again injections of air, as a rule, are of little consequence, and, beside, need never occur if the operator understands his business, and properly fills his syringe.

It is, perhaps, unnecessary to remark that cachectic, purpuric, diabetic, and alcoholic individuals are predisposed to sundry accidents, and that in infectious diseases the syringe should never be employed except under strict antiseptic precautions. Also, that injections should never be made on the nose, ears, eye-lids, different parts of the neck, scrotum, axilla, groin, fingers, etc., nor in œdematous regions or parts which are the seat of stasis, inflammation, or extravasation.

INSTRUMENTS.

Of the many syringes recommended, it is unnecessary to speak in detail, since all are very nearly of the same pattern. Three, however, deserve especial mention.

First, and to my mind, the best, is Leiter's, (Fig. 1.), with platina needles of exquisite sharpness and fineness, the barrel (D) cut from a solid block of glass, the bore beveled at either end, to accomodate the hard-rubber beveled fittings (*a*, *b*). It can always be kept tight; there are no washers and no cement to loosen and thus open the joints; the packing can always be spread and re-introduced without impairing its shape or utility; and there are no

FIG. 1.—Leiter's Syringe. Exact size, but needle too broad.

F. G. Otto & Sons,
New York.

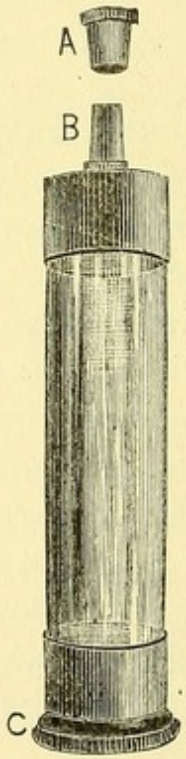

FIG. 2.—Solution Bottle for Leiter's Syringe.

screw fittings to bother. At *C* and *D* are depressions that enable the instrument to be firmly grasped and held. The exquisitely fine platina needle fits the barrel by a like beveled joint, as also does the bottle (Fig. 2.) that holds the solution. To fill the bottle, the cap C, at its base, is unscrewed; the bottle is also very convenient for the purpose of making solutions with tablets, when the latter are employed.

Another, the invention of Dr. Sheen, of Cardiff, Wales, manufactured by Ferris & Co., Bristol, England, has a capacity of five minims only, and is intended to be worn at the watch-chain to which it forms a convenient and elegant appendage; it is designed more particularly for morphia injections, and is of practical utility (Fig. 3).

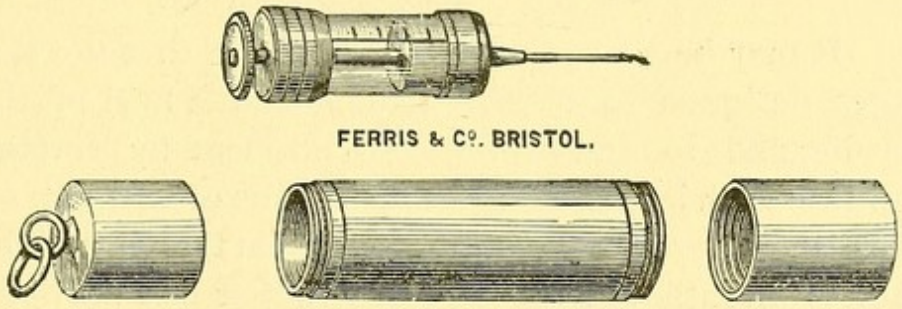

FIG. 3.—Full size.

The next two illustrations (Figs. 4 and 5) represent two forms of hypodermic pocket cases designed by Messrs. Parke, Davis & Co., of Detroit, the syringe being the same in each. Both hold several tubes of tablets that dissolve instantly on the addition of water, making perfectly limpid solutions. The advantage of

these tablets is, division of material with the greatest possible uniformity and exactness; further they keep indefinitely in any climate, and the materials of which they are composed are absolutely non-irritating.

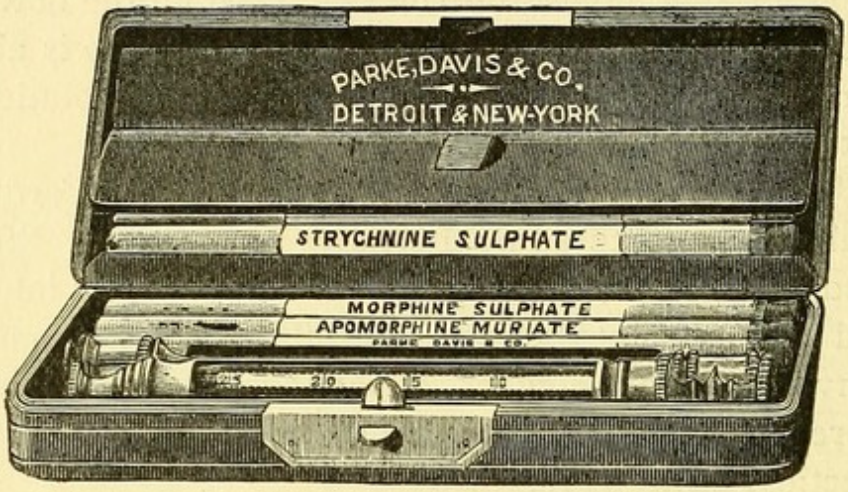

FIG. 4.—Full size.

It may be well to remark, *en passant*, that the syringes designed to receive tablets in the heel of the needle, and to dissolve the medicament by forcing fluid through it into it the cellular tissue of the patient, are utterly unreliable when employed in this way. The tablets oftentimes are not dissolved, or fine particles are forced into the tissues, and perhaps also left in the needle to its infinite damage. The tablet is best dissolved in a spoon, or within the barrel of the syringe itself, before employing as an injection. With P., D. & Co.'s syringe, the plunger may be removed, the tablet inserted, the required amount of water added, and when solution is complete the plunger replaced,

provided the guard cap (B—Fig 5.) that protects the needle-end of the instrument is not removed.

Figure 5 represents a plated metal case of flattened elliptical shape suitable for carrying in vest or card pocket, to replace the morocco case of figure 4.

The syringe of Messrs. P., D. & Co. provides, also, a special arrangement against leakage in case the plunger should become dry from disuse. Attached to the piston rod on the upper side of the plunger (C), is a small nut (A) that, on the rod being drawn up into the cap, fits there into a socket (F), when by a turn of the piston (D) the packing is expanded. Other advantages are: The ease with which the needle is cleaned —on the insertion of the wire into the needle cap it is immediately guided by bevelled sides to the opening in the needle proper; the reinforcement of the needle by a sheath embracing the upper half, strengthening in the part most likely to give way under pressure; and the fastening of the needles in the case by screw threads whereby their points are preserved from injury. Another advantage derived from this fastening, which is a left-handed screw, is the barrel can be screwed to the needle, and the latter removed without handling, aiding in preserving the needle aseptic. The syringe is furnished either with or without finger rests.

In filling care should be taken to exclude all air bubbles. In Leiter's instrument this is best done by drawing back the plunger before attaching the bottle

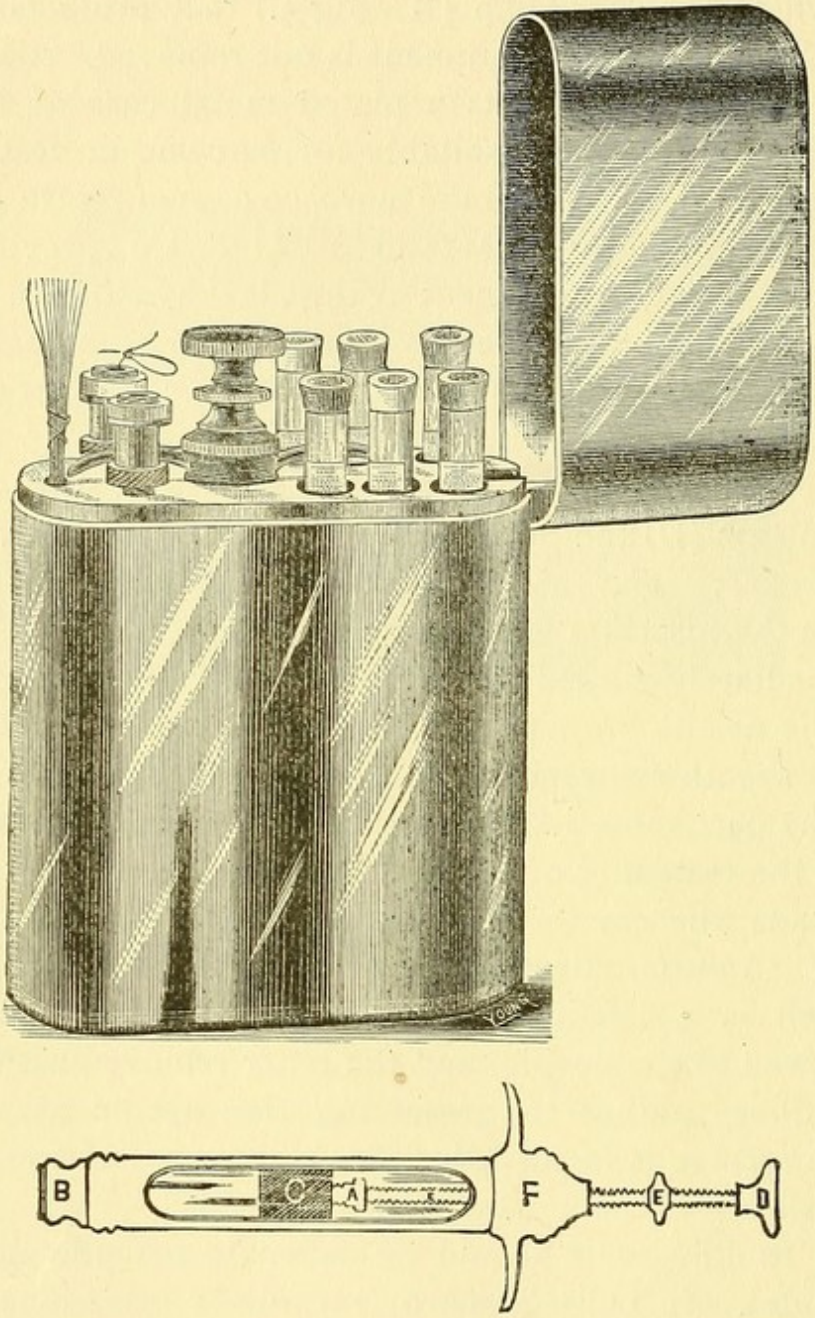

FIG. 5—Full Size.

(at *B*) to the barrel (at *a*), then forcing the air into the bottle, withdrawing the piston again, when the syringe, if held perpendicularly with the bottle above, is properly filled; the needle can now replace the bottle. Some introduce the needle into the cellular tissue before fitting to the syringe, but this is clumsy; it should be adjusted to the barrel beforehand, after having duly ascertained its perfect cleanliness, and that the instrument is in perfect order otherwise.

The operation performed, it remains only to cleanse the needle, and if necessary, disinfect it. It is always desirable to expel the last drop of fluid, and to rinse inside and out with clear water, followed by alcohol; and it should not be laid aside without inserting a fine wire, or, better yet, a pig's bristle. It is also a good plan, in order to always insure perfect asepsis, to keep the needles when not in use, immersed in a phial of alcohol. Needles that have become obstructed, may be cleansed by holding for an instant in the flame of an alcohol lamp, when the foreign substance is usually quickly driven off. If a wire has rusted in a needle, it should be dipped in oil before being held in the flame; and to remove the rust from the interior, oil may be passed through, heating again, then rinsing with alcohol.

EDITOR.

MANUAL OF SUBCUTANEOUS INJECTIONS.

ACIDUM BENZOICUM—BENZOIC ACID.

An anti-fermentive and anti-putrescent; slightly soluble in cold water (1 to 200), more so in boiling water (1 in 4), and in glycerin (10 per cent.); very soluble in alcohol, ether, and turpentine.

Is eliminated by the perspiration; by the saliva also as succinic acid; by the kidneys as hippuric acid; and by the lungs when the dose exceeds 15 to 30 grains. It gives rise to no remarkable phenomena, and is employed chiefly as an expectorant and excitant. The strongest solution employed by Rohde caused great pain, but never gave rise to abscesses or ecchymoses.

℞ Benzoic acid, 18 grains.
Alcohol, q. s. ft., 120 minims.

Dose, 5 to 15 minims (¾ to 1½ grs.). Both solution and syringe should be warmed to 98° F.

This solution may cause indurations that persist for several days, and sometimes induces puffiness and redness of skin.

Has been employed in pneumonia, typhus, uræmia, collapse, etc. It has also been recommended in the treatment of chronic bronchitis, cystitis, and gout (Currie).

BENZOATE OF SODA, which is soluble in two parts of water, appears to be possessed of more active properties than benzoic acid, but, as far as known, has not yet been employed hypodermically.

ACIDUM CARBOLICUM—CARBOLIC ACID.

PHENOL. PHENIC ACID.

An anti-putrescent and anti-fermentative. Soluble in all proportions in alcohol, ether, and glycerin, and in 50 parts of water.

Absorption is rapid, even through the unbroken cuticle, and elimination is correspondingly so, through the lungs, kidneys, and skin. The urine, without being necessarily heavily charged with the acid, often assumes a greyish-green hue, and sometimes there is albuminuria, especially after large doses.

From seven to thirty grains induces general excitement, followed by stupor, vertigo, *tinnitus aurium*, deafness, languor, sweats, diminution of pulse and temperature, colic, and diarrhœa. Poisonous doses result in vertigo, giddiness, tingling of fingers, intoxication, delirium, stupor, analgesia, anæsthesia, muscular debility, intermittent heart followed by arrest in diastole, collapse, coma, death—rarely convulsions as in lower animals.

Antidotes:—Saccharated lime (Husemann); sulphates (Baumann); inhalations of oxygen, bleeding, transfusion (Ferrand).

℞ Carbolic acid, 1 grain.
Distilled water to make 140 minims.

Dose, 10 to 20 minims, which produces a sensation of heat or burning, usually disappearing after a half hour; in large doses may procure small ecchymoses without abscess.

℞ Carbolic acid. 1 grain.
Glycerin to make 70 minims.

Five minims represents $\frac{1}{14}$ grain.

This has been used in traumatic erysipelas, which it arrests inside of five days according to Bœckel, who employed 15 minims in five or six injections in the healthy tissue at a distance of one centimetre from the diseased patch. He repeats the second time during the same day, pursuing the treatment until fever subsides and there is an arrest of erysipelatous inflammation.

[Recently Baccelli (*Semaine Medical*, 1888, p. 422, and 1890, p. xxiv.) has lauded the use of carbolic acid in subcutaneous injections in neuralgias in general, and particularly in the sciatic, supra-orbital, and intercostal forms. He also reports a case of tetanus cured by this means. A one per cent. solution was employed, making the injections over the seat of pain, repeating every hour till relief was obtained. He believes the efficacy of the acid is due to the sedative action which it exerts on the excitability of the nervous centres. But little pain or smarting follows the injections.—Ed.]

Carbolic acid has also been employed in intermittents (Jessier, Déclat, Heuter); prurigo (Rezek,

Fleischmann); diphtheria (Trotz); phthisis and tuberculosis (Schnitzner, Eliacopulos); crural neuralgia, pleuro-pneumonia (Hagen, Kunze); diabetes, charbon, malignant œdema, anthrax (Raimbert, Méplain, Trélat); nævus (Bradley, Stockwell); acute articular rheumatism (Bergonzini, Senator, Kunze); Ludwig's angina.

Carbolate of Ammonia has been employed hypodermically in typhoid.

ACIDUM HYDROCYANICUM.

HYDROCYANIC (PRUSSIC) ACID.

Hydrocyanic acid is soluble in all proportions in alcohol and water, and has a somewhat irritant action similar to that of morphine. Dr. Bartholow has employed that of the U. S. P. in four drop doses, but considers it too large, even a dangerous dose; in fact it is not prudent to exceed *two* drops, which, however may frequently be repeated, owing to its rapid elimination.

℞ Acid hydrocyanic dilute, U. S. P., 20 minims.
Camphor water, 40 minims.
Dose, from 5 to 12 minims (Ed.).

Cyanide of potassium, less potent than hydrocyanic acid, is readily soluble in water, in alcohol, and in glycerin (32 per cent.); and is prescribed hypodermically in doses of from $\frac{1}{7}$ to $\frac{3}{4}$ of a grain cautiously increased to $2\frac{1}{2}$ grains; but even in such feeble doses

as one per cent., it gives rise to severe pain, though without suppuration.

℞ Potassium cyanide, 1 grain.
Camphor water, 180 minims.
Dose, 5 to 12 minims (Ed.).

Cherry-laurel water is extensively used as a solvent for morphine, the mixture forming a clear solution [that, however permanent, is objectionable owing to the tendency to oxydize.—Ed.] The cherry-laurel water of the American and English Pharmacopœias contains exactly one per cent. of hydrocyanic acid, and is non-irritating except when it has become acid through oxydation by contact with air. Dose, 5 to 10 minims, cautiously increased.

[The essential oil of bitter almonds of commerce is a mixture of volatile bitter almond oil (*hydride of benzoyl*) and hydrocyanic acid, with small quantities of benzoic acid, benzoin, and benzamide. It is highly poisonous, being in general four times as strong as officinal hydrocyanic acid, for which it has occasionally been employed as a substitute; but at best it is a dangerous and uncertain remedy. Dose, $\frac{1}{30}$ to $\frac{1}{8}$ minim in alcohol and glycerin; the smallest amount is likely to produce urticaria and other unpleasant symptoms.—Ed.]

The effects of all three of these drugs are practically the same: Bitter taste, feeling of heat and burning, followed by numbness of the tongue, pharynx, and stomach; also salivation, increased number of respira-

tions—which become almost painful—elevation of blood pressure, slowing of pulse, and spasmodic phenomena. Pushed to toxicity, they induce nausea, vomiting, giddiness, fainting, difficult respiration—either slow or frequent, as they paralyze respiration and arrest internal respiratory changes—dilatation of pupils, lowering of blood pressure and temperature, feeble and imperceptible pulse, general tonic and clonic spasms, sensory and motor paralysis, coma, and death by asphyxia.

They are employed therapeutically in mental diseases, especially puerperal mania and eclampsia (Macleod); mania and melancholia (*Ibid*, Bartholow, and Maudsley); angina pectoris, gastralgia, functional vomiting (Harley, Brinton, Stille, Bartholow); lumbago (Estachy); [urticaria, lichen tropicus, eczema, impetigo, neuralgia (West, Fuller); nervous cough, cough of phthisis, whooping cough, dyspepsia of phthisis (Roe, West, Fox, Watson).—Ed.]

Antidotes.—Preyer asserts atropine is a physiological antidote, but the experiments of Bartholow do not support this view. Inhalation of ammonia is an antidote, but of very little use by the stomach; it should be administered hypodermically, or by intravenous injection.

ACIDUM OSMICUM—Osmic Acid.

Has been employed by interstitial injection in the treatment of tumors; and by Billroth and others in obstinate neuralgia, with varying results.

℞ Crystallized osmic acid, 1 grain.
Distilled water, to make 112 minims.

Dose, 5 to 15 minims. Keep in a vessel of black glass or lead. Eulenburg did not meet with any local or general disturbance from its use, but others report gangrene of the skin, œdema with greenish discoloration, etc.

ACIDUM PHOSPHORICUM—Phosphoric Acid.

MM. Michaliski and Hoffmann employed phosphoric acid subdermically in the treatment of the hæmoptysis of phthisis, but the results were scarcely such as to recommend further trial.

ACIDUM TANNICUM.—Tannin.

Tannin has been used as a derivative by Messrs. Luton and Schwalbe in doses of from 16 to 32 minims of a 1 in 10 or 1 in 5 solution. [From experiments on the ætiology and treatment of tuberculous diseases, "assuming the accuracy of the results and deductions drawn from them," remarks Dr. Currie, "it would appear as if some tangible benefit might be derived from the treatment of phthisis by hypodermic injections of tannin; nay, more, it does not seem unreasonable to surmise that some part at least of the benefit accruing from the administration of tannic and GALLIC acids in the treatment of hæmoptysis, may find its explanation in something above and beyond the astringent action of these drugs."—Ed.]

ACONITUM.—ACONITE.

Aconite and its preparations have been used in cardiac hypertrophy; tetanus (De Morgan, Sedgwick, Woakes); typhoid, intermittent, puerperal, and other acute inflammatory and septic fevers; neuralgia, especially of the *trigeminal* (Gubler, Fuller, Jones); cephalalgia (Lorent, Oulmont); acute rheumatism (Fleming, Neligan, Lombard, Keith); chronic rheumatism (Lorent, Eulenburg); arthritis deformans (Lobl); prosopalgia (Pletzer); angina pectoris, whooping cough; tonsilitis and catarrhal croup (Ringer); laryngitis and bronchitis (C. B. Stockwell); amenorrhœa (Copeland); gonorrhœa and chordee (Ringer); and for preventing rigors during or after the passage of a catheter into the urethra (Long).

In inflammatory conditions the best effect is obtained by minute doses frequently repeated:

℞ Tincture of *normal liquid* aconite (P., D. & Co's.), 10 minims.
Camphor water, 40 minims.
Dose, 3 to 5 minims every hour or two.

When only a single dose is required, as high as five minims of this tincture duly diluted, may be given.

ACONITINE is insoluble in glycerin, and nearly so in water; freely soluble in acidulated water, alcohol, ether, chloroform; its salts, however, especially the *sulphate*, are readily dissolved by water, but must be employed with exceeding caution.

℞ Aconitine, P., D. & Co.'s, 1 grain.
Dilute sulphuric acid, q. s.
Camphor water, to make 780 minims.

The first dose should not exceed 3 ($\frac{1}{60}$ grain) to 6 minims ($\frac{1}{30}$), slowly increased to 13 to 20 minims.

The effects of aconite and preparations are: Slowing of pulse and respiration; shooting pains in the first division of the 5th nerve from its centric action on the bulbar region and the deep nuclei; pricking and tingling sensations of the skin, especially around the nose, the lips, and extremity of the tongue; alteration of the sense of taste; noises in the ears, vertigo, debility and languor. *Larger doses.*—Intensification of these symptoms—sense of burning at tip of tongue; feeling of cold, of constriction of extremities; languor; somnolence; sense of weight in the head; pupillary dilatation; increase of urinary secretion, of sweat, and of saliva; tendency to syncope. *Poisonous doses.*—Nausea; vomiting; convulsions; fibrillary muscular twitchings; loss of the reflexes; motor incoördination; extreme prostration; complete anæsthesia; steady fall of temperature and pulse; inaudible voice; muscular paralysis, and disappearance of muscular contractility coincidently with loss of motor nerve power; coma; and death by asphyxia.

Locally, a solution of aconitine (1 in 500) produces an intense sensation of heat, and occasionally a sense of burning which persists for considerable time.

Antidotes.—Richardson has used with success hypodermic injections, and Wood, unsuccessfully however, intravenous injections, of ammonia. Finally, "even when the cardiac contractions are gravely affected, or have actually ceased, it is possible to re-establish them by the artificial stimulus of electricity."—(Maury.)

NAPELLINE.—[An amorphous alkaloid of aconite, soluble in water, ether, alcohol, etc. The advantages it possesses over the fluid preparations of aconite, or aconitine, are more than problematical.—ED.]

AGARACINUM—AGARACIN.

Has been extolled by Seifert, Piering, and others, by whom it was used to check excessive perspiration, and who claim also that it diminishes the frequency of cough in phthisis, without inducing either nausea or diarrhœa; sleep is more tranquil and uninterrupted. As the maximum activity is only attained five or six hours after administration, it is necessary to give at various times according to the nature of the malady. Seifert discourages the use of the drug altogether, since given by the mouth it induces an intractable diarrhœa, and employed hypodermically produces an intense burning sensation.

℞ Agaracin, 1 grain.
Absolute alcohol, 80 minims.
Glycerin, up to 200 minims.

Twenty minims may be used at one time, which represents $\frac{1}{14}$ grain.

ALCOHOLUM—Alcohol. Spts. Vini Recti.

For hypodermic use is best employed at a temperature of 90° F.; at a higher temperature there is danger of burning the tissues, and even at this, if too near the extremities, there is the same risk. At a lower temperature it tends to diffuse, and its local effects are proportionately less intense; but then one is administering a stimulating injection with general action. The doses must be calculated according to the results desired, hence no definite figure can be fixed. It produces neither abscess or sloughs—merely a smarting sensation which speedily subsides—and is largely used as a diffusible stimulant. Flood made more than 200 injections of whisky and coffee in four hours in a case of opium poisoning, with complete success, though at the same time he injected *tincture of belladonna* in 10 and 20 minim doses, which may have contributed to the result. Edward Warren (1867) and Ainsworth injected brandy in collapse, and Breisky and Figuero had good results from the same in acute anæmia due to puerperal hæmorrhage or traumatism.

Alcohol Ammonio-Anisetum.—Ammoniated alcohol with anise, is prepared by Zuelzer, of Berlin, according to the following formula:

Essence of anise, 10 minims.
Alcohol at 85°, 40 minims.
Solution of ammonia, 50 minims.

Fifteen to thirty minims of this solution employed in adynamic typhus. He has observed sometimes small abscesses as a result of this injection. Eulenburg injected 5 to 7 drops in cases of collapse, sometimes alone, sometimes mixed with an equal quantity of distilled water.

ALOE.—ALOES.

℞ Aloes, 10 grains.
Glycerin and camphor water up to 100 minims.
Filter.

Dose 15 minims (1½ grains), which, injected under the skin of the forearm produces a decided laxative effect in the constipation of typhus (Luton).

Solutions made with *extract* of aloes are useless owing to the local irritation induced.

ALOIN has been employed in aqueous solution (1 to 25) as a cathartic, without local disturbance (Stenhouse), its effects being observed in from three to five hours except in obstipation. Dr. Klein alleges that aloin diminishes inflammation and intra-ocular pressure in glaucoma, acute keratitis, etc. Subcutaneous injections of aloin, and of watery extract of aloes, have been administered, hitherto without success, by Cohn, in the constipation of insanity. After the injection of strong doses of aloin in animals, he observed a hæmorrhagic ulcerative gastritis, and changes in the kidneys resembling those which ensue on poisoning by chromium salts.

AMMONIÆ LIQUOR—Water of Ammonia.

Has been employed hypodermically in the treatment of bites of venomous insects and reptiles; alcoholism complicated with sunstroke (Willis Cumming); syncope from intra-uterine hæmorrhage (Currie); cholera (Monteverdi); and general collapse.

Liq. ammon. sulphurat., 1 drachm.
Aquæ distillat., 3 drachms.
Dose, 30 to 90 minims as required.

In a case of poisoning by *tincture of aconite*, Richardson injected 40 minims of ammonia after the pulse had ceased ten minutes. This was repeated four times at intervals of ten minutes. Four days afterwards, all trace of poisoning had disappeared, but there was observed at one point of injection a small patch of sloughy skin.

Valerianate of Ammonia has also been used hypodermically, in doses of from 1 to 5 grains.

Ammonia and its salts are characterized by such excitant and stimulant properties, that they are of the greatest service in the treatment of collapse in the most diverse diseases.

AMYL NITRITE.

[Amyl nitrite is a powerful sedative and antispasmodic. It lowers temperature by ozonizing the blood, thereby checking oxydation, and relaxes the arterial system greatly reducing arterial pressure. As

a rule it is much more effective by inhalation than by the mouth or subdermically. Indeed, the results obtained by hypodermic use are uncertain, though Dr. Barnes claims to have secured effects precisely parallell to those occurring to administration by inhalation. Drs. Bourneville and Bricon assert "from 16 to 80 minims have been injected in the dog, and 90 minims in man, in one and a half hours," but this statement is open to grave doubt. Personal experience has taught that ten minims hypodermically may prove unsafe, even if given in divided doses, in the time indicated, as it tends to paralysis of respiration.

I have found the following of great benefit oftimes in dysmenorrhœa,—and Mary Putnam Jacobi has obtained equally satisfactory results from amyl by inhalation:

℞ Amyl nitrite..... 10 parts.
Alcohol..... 30 "
Glycerin..... 60 "

Dose 8 to 15 minims (in lumbago and sciatica, deeply injected.)

S. Weir Mitchell, Jones, and Maraghano have obtained good results in epilepsy; it often proves effective in sea-sickness, but like all remedies for this malady is not inevitable in overcoming. It is invaluable in whooping-cough, if given *per orem*, just before the onslaught of the paroxysm, hence might be tried subdermically. Its antidotes are chloroform, and cocaine.—Ed.]

ANTIMONIUM TARTARATUM.—Tartar Emetic. Tartrate of Antimony.

Soluble in water 1 in 15; in glycerin 5½ per cent.; insoluble in alcohol.

It may truly be said that tartrate of antimony is hardly ever indicated except as an emetic.

℞ Tartrate of antimony, 1 grain.
Tartrate of morphine, $\frac{1}{8}$ grain.
Distilled water, up to 40 minims.

Dose, 10 minims ($\frac{1}{4}$ grain).

AQUA—Water.

Has been repeatedly substituted with success for morphine in localized painful affections, in doses of from 15 to 35 minims. It causes some little sharp pain, but never gives rise to ill-effects. [" Dr. Fergus of Glasgow," says Dr. Currie " declares that in many cases acute pain can speedily be relieved by the injection of *hot* water. The syringe should first be warmed thoroughly, and the temperature of the water raised to as high a degree as can be borne without causing actual pain. In one case of colic this method afforded relief from suffering very speedily, but in cases where it was used for the relief of tabetic pains the effect was at the most equivocal."—Ed.]

ARBUTINUM.—Arbutin.

A glucoside from *Arctostaphylos Uva-ursi*, soluble in water, yielding hydroquinon by decomposition in

the system. Our knowledge regarding this drug is meagre and unsatisfactory, but it is generally deemed a valuable diuretic, relieving catarrhal conditions of the bladder, and even renal hæmorrhages. In cases of purulent inflammation of the bladder and kidney, it exercises a direct antiseptic influence, lessening the formation of pus. Dose, subcutaneously, 4 grains.

ARGENTI NITRAS.—Nitrate of Silver.

The pain which follows hypodermic injections of silver nitrate are often very sharp, although of short duration. "They are irritating to the degree of almost necessarily producing an abscess at the point of puncture; nevertheless, the silver limits, in a manner, its own action by the zone of coagulation which it produces. There is no kind of inflammation more limited—in the centre, a slough and a sero-purulent collection which isolates and eliminates it; at the circumference a ring of induration, often almost of cartilaginous consistence" (Luton). The artificial abscess allows of the escape of serous or purulent fluid, carrying with it a slough of cellular tissue, leaving a cicatrix.

℞ Crystallized nitrate of silver, 10 grains.
Distilled water to make 120 minims.
Dose, 5 to 20 minims.

A solution of 1 in 5 almost always determines slough and abscess; and rarely the former is not separated but remains encysted in the living tissue like a

foreign body. With a solution of 1 in 20, it is to be observed that the irritation decreases the nearer the injection is made to the trunk; thus, when made at the hip there is no certainty of an abscess resulting. M. Luton does not think that there is any advantage gained by using the weaker solutions. Without referring to its use for surgical purposes, nitrate of silver has been employed hypodermically in neuralgia (Luton, Ruppaner, Bertin and Michaliski), rheumatism, gout (Ruppaner), chronic arthritis, tabes dorsalis (Frommhold).

ARSENIUM.—Arsenic.

℞ *Fowler's solution*, 2 drachms.
Camphor water, 3 drachms.
Dose 5 to 20 minims.

Eulenburg claimed to have obtained good results in the various form of tremor (paralysis agitans, &c.); Kobner, in lichen ruber, and in a case of diffuse sarcoma of the skin (child of 8 years); Lesser, in lupus; Soltzmann, in chorea, etc.,—no particular symptom was observed, however, save that patients occassionally complained of nausea. [Bartholow recommends *liq. sodii arseniatis* in preference to Fowler's solution, for hypodermic purposes, as it is less irritating in its local effects, less apt to produce arsenical poisoning, and possesses greater osmotic effect. The injections are made on alternate days, and in different situations so as to minimize the local

effects. Personally, in most instances where an *alterative* effect is desired, and in the majority of skin diseases, Donovan's solution, (*liq. arsenii et hydrargyri iod.*) is preferred, and it may be employed in the same way as Fowler's solution.—Ed.]

Arsenic is recommended in: Chorea (Radcliff Hammond, Smith); cholera—algid stage (von Graëfe); various forms of tremor (Eulenburg); paralysis agitans (Bourneville); psoriasis (Lewin, Lipp, Tichomirow); chronic eczema (Lipp); neuralgia, epilepsy, psychoses, etc. (Radcliffe, Tebaldi).

In small doses it causes a sensation of heat in œsophagus and stomach, increase of appetite, increase of organic functions, diminution of urea and carbonic acid, lowering of temperature and pulse. In large doses, feeling of constriction of throat, thirst, epigastric pains, nausea, vomiting, colic, diarrhœa, fever, headache, insomnia. In poisonous doses, diarrhœa with rice water stools that sometimes may be bloody, cramps, aphonia, pallor of the face, debility, irregular and rapid pulse, scarcity and suppression of urine, dyspnœa, cyanosis, unconsciousness, delirium, convulsions, death.

Slow poisoning.—Cutaneous eruptions (eczematous, scarlatiniform, &c.); conjunctivitis, extreme anæmia, loss of hair and nails, inflammation and ulceration of nasal and laryngeal mucous membranes; paralysis, chiefly of the extensors; dropsy, cachexia, fatty degeneration of most of the organs. Elimination is by

the bile, urine, and perspiration, and its duration is most variable. The physiological effects of arsenic further than this are but little known.

ASPIDOSPERMINUM AND QUEBRACHINUM.

Aspidospermin the active principle of *Aspidosperma quebracho*, is soluble slightly in water, freely so in alcohol, ether, and essential and fixed oils, not at all in glycerin. The phenomena observed after administration are, decreased frequency of the pulse and respirations (Berthold, Picot, Berger, Laquer). Continued use induces headache, vertigo, mental hebetude, and profuse salivation (Laquer, Berger). Quebrachin, another active principle, is analogous in action to curare. According to M. Closson, paralysis of the limbs in those which survive in poisoning by aspidospermin, would be due to an action of the poison on the nervous reflex centres in the spinal cord, the excitability of which is lost before the peripheral nerves, motor and sensory, and the muscles, have been attacked by the poison. But with sufficient doses of aspidospermin, the peripheral nerves are first paralyzed, then the muscles lose their sensibility to stimuli to an equal extent.

The *sulphate* and *hydrochlorate* are amorphous readily soluble salts; their solutions are intensely bitter, and are deemed useful in dyspnœa of all kinds (Bourneville).

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℞ Sulphate of aspidospermin, 5 grains.
Camphor water, up to 160 minims.
Dose, 8 to 16 minims *plus*.

[Dr. Currie justly remarks: "The statement that quebracho and its preparations may be used in all forms of dyspnœa, must be accepted with caution. It has however, been used in dyspnœa dependant on various forms of cardiac disease, *e. g.*, hypertrophy, aortic incompetence, etc. From the experiments of Harnack and Hoffmann, it appears that the greatest therapeutic value of quebracho bark consists in its property of reducing the irritability of the respiratory centre. It will prove beneficial in cases of dyspnœa *not* depending on impeded aëration or insufficient oxydation of the blood in the lungs, and that is not a mere compensatory symptom; namely, in dyspnœa in consequence of disorders of circulation and of diseases of the heart. In other cases, in which the dyspnœa constitutes a purely compensatory manifestation, any attempt at lessening the irritability of the respiratory centres may, under certain circumstances, be fraught with danger, although this remedy may even then occasionally assist in relieving this distressing symptom." Aspidospermin is an emetic, and more energetic than apomorphine, but does not act in the same way on the brain and respiratory centres.—Ed.]

AURI CHLORIDUM—Chloride of Gold.

℞ Chloride of gold, 1 grain.
Distilled water, 560 minims.
Dose, 16 minims ($\frac{1}{35}$ grain).

[Recommended in the treatment of certain syphilitic symptoms; and has been successfully used by M. Moricourt in hysterical anæsthesia in a solution of 1 part in 500 and 1000.—ED.]

BELLADONNA.

℞ Neutral sulphate ATROPINE, 1 grain.
Camphor water, 2 ounces + 160 minims.

Sixteen minims of this solution contains $\frac{1}{70}$ of a grain of atropine sulphate.* It is always wise to begin with a small dose, say $\frac{1}{140}$, and to rarely exceed $\frac{1}{35}$ of a grain. "In the following formula, morphine combined with sulphate of atropine, permits us to obtain all the good effects of these two drugs, especially in the treatment of pain and insomnia, and to increase the dose with safety" (Dujardin-Beaumetz):

Hydrochlorate of morphine, 1 grain.
Sulphate of atropine, $\frac{1}{10}$ grain.
Cherry laurel water, up to 224 minims.

Sixteen minims contain $\frac{1}{14}$ of a grain of morphine and $\frac{1}{140}$ of a grain of atropine. [This combination, has long been extolled, but is alike unchemical, unphysiological, and unpharmaceutical. The effects claimed are indefinite, and depend solely upon the idiosyncrasies of the patient that permit one or the other drug to assert itself to the exclusion of the

* It will be well to remember that very little *atropine* is to be had in market, the alkaloid usually sold under the name being *hyoscyamine*—ED.]

other. The effects for the most part are those of atropine.

Extract and *tincture* of belladonna have been used hypodermically, but there is a general complaint that abscesses follow their use. This, however, has not been my experience when duly diluted with a saturated solution of borax in camphor water, or when the *normal liquid* belladonna (P. D. & Co.,) was used.—Ed.]

Belladonna and atropine are chiefly indicated in neuralgia, spasmodic asthma,* nocturnal incontinence of urine, chorea, poisoning by fungi, intestinal obstruction, vaginismus, tetanus, epilepsy, sweats of phthisis, vomiting of pregnancy, and hysteria; atropine is of marked service as an anti-sudorific, anti-sialagogue, and for the relief of pain. M. Tacke attributes to it even greater hæmostatic properties than ergot when employed subdermically.

The preparations of belladonna, including its active principle, in *small* doses produce dryness of the mouth and throat, and dilatation of the pupils; *in larger doses*, difficulty of speech and deglutition, facial

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* "Atropine must not be used in asthma, when there is dryness of the tongue and mucous membranes generally, with absence of bronchial secretion. If employed in such cases, it might give rise to most alarming symptoms" (Currie). This does not always contraindicate *tinct.* of belladonna, however. It should be borne in mind, also, that great caution is necessary in administering *atropine* and *hyoscyamine* to light-complexioned, flaxen-haired, nervous females!—Ed.

anæsthesia, blindness, cephalalgia, vertigo, delirium, hallucinations, nausea, slowing followed by acceleration of pulse, scarlatiniform redness of the skin, œdema; *in poisonous doses*, aphonia, muscular spasms, collapse, coldness of the surface, and finally death with arrest of the heart in diastole. Symptoms of poisoning appear in a few minutes. Elimination is effected rapidly by the kidneys.

No accident is likely to occur, however, provided the solution used is perfectly pure, contains neither acid nor alcohol, and is freshly prepared.

Antagonisms.—Calabar bean, physostigmine, and pilocarpine; as to muscarine, antagonism has not been conclusively proved.

HOMATROPINE, according to Fronmüller, does not include any of the poisonous elements of atropine; its local mydriatic action is quick and decided (2 per cent. solution), and the pupil rapidly returns to the normal condition. It diminishes tubercular sweats.

Hydrobromate of homatropine, P., D. & Co., 1 gr.,
Distilled water, up to 80 minims.
Sixteen minims=$\frac{1}{5}$ of a grain.

Neither mydriasis or narcotic phenomena are induced; cough, expectoration and insomnia are relieved.

Dr. William Murrell has found these injections less efficacious than those of atropine. Homatropine has been used, among other remedies, in cases of poisoning by pilocarpine (Fronmüller).

BROMINUM.—Bromine.

Soluble in 40 parts of water, in alcohol, ether, carbon bisulphide, chloroform, glycerin. Used by Goldsmith hypodermically in hospital gangrene in one drop doses, in the immediate neighborhood of the wound, when, after forty-eight hours the latter lost its characteristic appearance.

[Dr. Carvallo, U. S. A., informed me that, witnessing some of the experiments, he was shocked at the pain induced, and that while bromine changed the character of the wound, it also induced ulceration equally objectionable and terrible.—Ed.]

CAFFEINA—Caffeine and Salts.

Soluble in 80 parts of water and in 50 of alcohol, but is very unstable. Most of the solutions produce a sense of burning due to the addition of acid or alcohol.

℞ Caffeine, 1½ grains.
Alcohol, 6 minims.
Camphor water, up to 96 minims.

Dose, 8 to 20 minims, *plus*.

℞ Caffeine, 20 grains.
Salicylate of sodium, 17½ grains.
Camphor water, to 1 drachm.

Dose, 1 to 6 minims; contains 1 grain in 3 minims.

Particularly recommended for alcoholic and morphine intoxication, also for hemicrania (Currie).

Garrison and M. Pallen have injected liquid extract of coffee in cases of acute morphinism with success.

Therapeutically, caffeine, or a liquid extract of coffee (Parke, Davis & Co.'s *fluid extract*) may be used in neuralgia (Eulenburg, Anstie, Pletzer); migraine (Lorent); insomnia in chronic alcoholism without delirium (Anstie); melancholia, hysteria, cholera (Oser); strangulated hernia (Guzman); heart disease where digitalis is contra-indicated (Riegel)—in the latter case it is well to begin with small doses, and if necessary increase them rapidly; its greatest effect is obtained by small doses frequently repeated, and it acts more rapidly than digitalis without producing cumulative effects (Currie). Further, caffeine has been strongly recommended as a diuretic—daily doses of 7 to 12 grains of the citrate and hydrochlorate, induced such abundant diuresis that general œdema disappeared in a few days, and being non-cumulative, it may be steadily administered for months (Gubler, contradicted by Riegel, who employed in 8 cases of pleurisy and 4 of nephritis, and found inferior to other diuretics). Also, it has been recommended in the treatment of asthma by Thorowgood. Its action on the temperature is the reverse of quinine (Currie). In small doses, (1½ grains), there is increase of functional activity of the brain without any kind of trouble; increase of force of circulation and of vascular tension.—Doses of 6 to 16 grains, by subcutaneous injection, induce moderate slow-

ing of cardiac contractions, and increased fulness and tension of the pulse (Riegel).—In large doses, increase or diminution of pulse rate, lowering of blood pressure, elevation of temperature (Binz), headache, tremor of the hands, nausea, vomiting, drowsiness, tinnitus aurium, muscæ volitantes, priapism, frequent desire to micturate, hallucinations, vertigo, acceleration then diminution of the respirations; increases also reflex excitability. Poisonous doses in animals induce general paralysis, arrest of the heart in diastole, death.

Elimination takes place by the urine without modification, and by the bile (Strauch). The *sulphate*, *hydrochlorate*, and *hydrobromate*, decompose in water. The *citrate* is merely a mixture of caffeine and citric acid (Jehl).

CALABARINA. PHYSOSTIGMINA.—Calabarine. Physostigmine. Eserine.

Physostigmine, or eserine, is slightly soluble in acidulated water, and very soluble in alcohol, ether, and chloroform. Most of the salts are soluble in water. The solution of *sulphate* of eserine on exposure to air and light assumes a violet-red color, more or less intense, the transformation into red eserine being much less active in the case of eserine than of its sulphate. The *salicylate* of physostigmine is soluble in 150 parts of water and in 12 parts of alcohol. The solutions of this salt are yellow, but

become red under the influence of light. Calabarine, another alkaloid (Harnack and Witkowski), is rarely employed medicinally.

℞ *Extract of Calabar bean*, 2 grains.
Distilled water up to 80 minims.

Dose, 10 minims (¼ gr.) every two hours which may be increased to $\frac{3}{4}$ gr.

℞ Physostigmine, 1 grain.
Alcohol, q. s.
Distilled water to make 128 minims.

Dose, 16 minims, ⅛ grain (Erlenmeyer).

℞ Eserine, 1 to 5 grains.
Distilled water (acidulated?) to 112 minims.

Dose, 4 minims, $\frac{1}{28}$ to $\frac{1}{6}$ grain.

[Bourneville and Bricon assert eserine and its sulphate may be injected in doses of from $\frac{1}{24}$ to $\frac{1}{16}$ grain, but these are perhaps too large, and apt to produce either a slight degree of paralysis of the diaphragm, or some embarassment of this muscle. "The hypodermic use of eserine sulphate produces a very sharp pain which lasts from one to six hours" (Suarez y Cruz).

In spite of all claims and the multitude of formulæ, I have been unable to secure a satisfactory solution except as follows:

℞ Extract of Calabar bean, 2 grains.
Camphor water, 60 minims.

Make fresh as required, since no solution will keep any length of time. Five minims represents $\frac{1}{4}$

grain. Messrs. Parke, Davis & Co., prepare hypodermic tablets of *sulphate of physostigmine*, each representing $\frac{1}{400}$ grain, which are most satisfactory.—Ed.]

As in the case of coniine, the results given by various investigators are very contradictory regarding physostigmine *et al.*, and this is doubtless due to the varying composition of the preparations employed, and also to the varying proportion of alkaloids contained by the Calabar bean. Nevertheless, the preparations of Calabar bean act alike on the eye, salivary glands, intestines, heart and respiration; their action on the spinal cord depends on the proportion of physostigmine or Calabarine. They are employed in: Ptosis (Schelske), enuresis (Frommüller), poisoning by strychnine (Newman), tetanus (Watson, Monti, Rottrock, Franzolini, Duffy, Suarez y Cruz, Th. Anger, Reulos), chorea (Harley, Ogle, Bouchut, Cadet de Gassicourt and Suarez y Cruz), trismus neonatorum (Eschenburg).

Bromide of eserine, soluble in water (especially warm water) and in alcohol, insoluble in ether, chloroform, fixed and volatile oils, slightly soluble in glycerin, possesses all the properties of eserine and its salts; is perfectly neutral, and produces no local irritation. Its solution is more stable than that of the other salts of eserine (Duquesnel). There is no evidence that it has ever been employed hypodermically.

The physiological phenomena induced by Calabarine and physostigmine are: Pallor, then redness of the skin, abdominal pains, vomiting, embarrassed respiration, vertigo, feeling of extreme languor, myosis, salivation, sweats, slowing of the pulse (Fraser—toxic phenomena observed in *himself*); watery and muco-sanguinolent diarrhœa; slowing, and finally cessation of respiration; complete paralysis and collapse (Evans). Death as by asphyxia. Paralyzing effect on the central nervous system; stimulating then paralyzing effect on the peripheral nerves. Dose of $\frac{1}{140}$ to $\frac{1}{70}$ of a grain is sufficient to induce poisonous symptoms in man (Harnack). In a case of epilepsy with idiocy, physostigmine admin-is in doses of $\frac{1}{140}$ of a grain three days in succession, increased alarmingly the number of fits. Elimination is effected by the saliva and bile.

The mutual antagonism between physostigmine and atropine is admitted by most authors, but is denied by Messrs. Frohlich and Rossbach. Some have also asserted a reciprocal antagonism between physostigmine and strychnine.

CAMPHORA.—Camphor.

A feeble antiseptic soluble in alcohol, ether, the volatile and fixed oils, and in acetic acid. Hypodermically, it induces sharp pains without consecutive local accidents.

℞ Camphor, 5 grains.
Ether, 40 minims.
Distilled water, up to 80 minims.

Dose, 15 to 40 minims. [A bad preparation and most painful.—Ed.]

℞ Camphor, 5 grains.
Oil of sweet almonds, 112 minims.

Dose, 20 to 60 minims.

Employed chiefly in adynamia with extreme prostration; [is very popular in Germany in the treatment of low febrile maladies.—Ed.] Luton and Eulenburg praise camphorated brandy in doses of 16 to 32 minims; and Jürgensen also recommends camphorated oil in acute anæmia.

The principal physiological effects are: Slowness and reduction of pulse, increase of blood pressure, reduction of temperature, increase followed by decrease of respirations, cephalalgia, incoherence in talk, hallucinations generally of pleasant character (Purkinje); or, from the first, lassitude, mental prostration, yawning, insensibility and loss of consciousness (Alexander, Malewski), convulsions, paralysis of nerves of sensation, of the bladder and rectum, of cornea, death. If the dose has been large without being lethal (30 to 80 grains), there is only the stage of exaltation. [Persons addicted to alcohol often consume enormous doses of camphor—in one known instance over an ounce and a half at one time—with impunity.—Ed.]

Monobromated camphor is sparingly soluble in water; soluble in alcohol, ether, fixed and volatile oils, sulphide of carbon, and glycerin; local effects almost *nil.*

Monobromated camphor, 3 grains.
Alcohol, 26 minims.
Glycerin, up to 48 minims.
Dose, 20 to 50 minims.

Among the physiological phenomena induced by this drug are: Diminution in number of heart-beats and of respiratory movements; lowering of temperature, drowsiness, clonic convulsions, and tremors of the limbs. Prolonged use induces emaciation and abolition of the pharyngeal reflexes (Petrovitz); it does not appear that habituation to this drug can be established. Elimination is by the kidneys (Pathault, Rabuteau).

CANNABIS INDICÆ.—Tincture Indian Hemp. Normal Liquid Cannabis,—*Hasisch. Bang. Sutjee.*

[Hunter used Indian hemp subcutaneously in tetanus, sciatica, and *tic douloureux;* in neuralgia it ranks second only to morphine. It has been successfully employed in mental troubles, nervous and spasmodic diseases (O'Shaughnessy, Müller, Chuckerbutty), chorea (Radcliffe, Hülier, Douglas, Oxley), epilepsy (Reynolds), rheumatism (Fuller), asthma (Hyde Salter), hay-fever (McKenzie), senile catarrh (Waring-Curran), dysmenorrhœa (Waring), menor-

rhagia, uterine hæmorrhage, threatened abortion, inertia or atony of uterus prolonging labor—(Churchill, McGuire, McClintock, C. M. Stockwell, G. A. Stockwell), cancer of uterus (Grailey Hewett) palpitation of heart, eczema (Christison), cholera (Willeman, O'Shaughnessy), ulcer of stomach (Bimton), hysteria (Reynolds), dropsical affections and Bright's disease (Bryan). In fact it is a drug of wondrous scope and utility, too little known or understood.—Ed.] Dr. Strange, of Worcester, obtained good results in the early stage of mania with delusions, as did Fronmüller from cannabis *tannate* in nervous insomnia (Currie), and in one case of chronic miliary tuberculosis, where the prolonged use of morphine had been productive of no result. Eulenburg obtained by hypodermic exhibition, calmer sleep and perceptible diminution of cough and pain.

℞ [*Normal liquid* cannabis Indica, 10 minims.
Glycerin,
Camphor water, ää 25 mimins.

Dose, 5 to 15 minims as required; no unpleasant symptoms develop.—Ed.]

In moderate doses is followed by a sense of warmth, tingling and pricking, weight in head, tinnitus aurium, oppression, uneasiness, constriction of the throat, dryness of the mouth, nausea, vomiting, diarrhœa (?)—these are not always observed, however. In *larger* doses it is a powerful nerve excitant; there

is very great activity of the intellectual faculties, mirthful and sometimes furious delirium, sense of physical and moral well-being, and of lightness; illusions and hallucinations, chiefly visual; increased acuteness of hearing [increased sexual desire—satyriasis—Ed.]; the movements of locomotion are spasmodic or incordinated; sleep sometimes disturbed by night-mare. In *poisonous* doses, deeper coma allied to that of narcotism, anæsthesia and analgesia; rarely there is a manifestation of cataleptic phenomena, lassitude, cephalalgia. The opinions of authors are contradictory as to the effect of cannabis Indica on the circulation and temperature. The bronchial, urinary, and sweat secretions are increased.

Chronic poisoning.—Physical and mental enfeeblement, listlessness and melancholia, very marked emaciation, stiffness, and sometimes tremblings of the limbs and slowness of movements.

CEDRINUM.—Cedrin.

An amorphous product of the seeds of *Simaba cedron*, readily soluble in water. In a dose of $\frac{1}{16}$ grain hypodermically administered, it caused vertigo in an adult. [Its tonic nature is indisputable, and it is to a moderate extent a febrifuge; it is frequently successful in relieving ague and intermittent fever if persisted in, along with the use of hepatic stimulants. Its claimed antidotal properties in poisoning by venomous reptiles, etc., are mere pretension and superstition.—Ed.]

CHLORAL HYDRATE. CROTON CHLORAL.

[Both have been employed hypodermically, but are unfit for such administration. The former, however, is excellent added in small proportions to solutions of morphine to preserve them. Dr. Currie thinks the unpleasant effects might be minimized, if not entirely obviated, by practicing deep intra-muscular injections in the gluteal region, but this is not borne out by the writer's experience.—Ed.]

CHLOROFORMUM—Chloroform.

First employed hypodermically by Hunter, who discontinued its use on account of the acute pain and intense inflammation to which it gave rise. It was injected again, chiefly in neuralgia of the *trigeminal*, by Drs. Bartholow, Weir Mitchell, and Mattison. The latter, after an injection of half a drachm, noted a sharp pain lasting four minutes, puffiness round the puncture, and narcosis for two hours; the neuralgic attacks recurred. M. Collins injected successfully 30 to 40 minims in cases of old-standing sciatica. M. Cérenville observed in one of his patients, after injections of chloroform which were not painful (50 minims in posterior portion of middle of thigh), complete anæsthesia of the limb; in another, a painful induration. In cases of sciatica of long standing which had resisted every other mode of treatment, he obtained success by this method, but it must be observed that he found it necessary to make a large number of

injections. [Let me remark that in long standing sciaticas in the *aged*, serious abscesses may result.–Ed.]

CINCHONA SALTS.

Quinidine, which is isomeric with quinine, possesses very nearly the same physiological properties, but neither it nor its salts are suitable for hypodermic purposes.

Quinine.—English quinine is very sparingly soluble in water (1-576) but readily dissolves in alcohol; American is scarcely at all soluble in either water or alcohol; both are readily dissolved by dilute acids and chloroform. It is an anti-putrescent, anti-fermentative (Binz) anti-zymotic, [and oxytoxic—Ed.], sialagogue (slightly), and diminishes tactile sensibility; it dulls the sense of hearing, causes tinnitus aurium, auditory hallucinations, vertigo, sense of weight of head, confusion of ideas, carotid pulsations, cephalalgia, quinine intoxication, ataxic gait, apathy, drowsiness, general prostration, dilatation of the pupils, and nausea: In larger doses, vomiting, delirium, deafness, occasional blindness, and aphasia: In *poisonous* doses, collapse, convulsions, and death.

There is increased volume of the red corpuscles due to increased supply of oxygen, and also disappearance of amœboid movements of the white corpuscles,the number of which is diminished. In *moderate* doses there is first increase, and then slowing of the cardiac pulsations, due to lowered blood pressure;

finally, there is arrest of respiration, followed by paralysis of the heart. In healthy persons the effect on the temperature is either *nil* or trifling. [It is a powerful antipyretic, and properly employed, vastly superior to any of the newer drugs of this class.—Ed.] Elimination is effected rapidly and chiefly by the kidneys, the secretion of urine becoming very abundant, while the secretion of sweat is arrested. In some rare instances various eruptions (eczematous and scarlatiniform), and hæmaturia, have been observed after the administration of quinine. [Some cases of tetanus have been ascribed to the sub-cutaneous use of quinine, but the result undoubtedly was chargeable to the septic character of the instrument employed rather than to the medicament it bore. *Muriate* of quinia is less apt to produce cinchonism than the other salts, is the most stable, and the proportion of contained quinia moreover, greater; it is the most suitable of all the salts of quinine for any purpose whatever. A larger portion of the *sulphate* on the market is little else than *sulphate of cinchonidia* (65 per cent.)—Ed.].

As a general rule, great circumspection is required in using hypodermic injections of quinine and its salts, for, in many instances, it produces, besides pain, persistent indurations, followed by suppuration and even gangrenous sloughs. [Especially is this true of the sulphate.—Ed]. It is advisable to inject no more than 15 minims at one point, and to expel the fluid very gently. In cases of urgency, such as pernicious fevers,

we ought not to be deterred from using hypodermic injections by the risk of local accidents. Glycerin is often the best vehicle; it dissolves one part in six, by weight, by means of heat, but in the cold it dissolves only 3 per cent. M. Denis, who has employed solution of the sulphate in glycerin, has discontinued this form, as he could only obtain weak solutions ($\frac{1}{4}$ grain to 8 minims) even with the aid of heat.

℞ Muriate of quinine, 32 grains.
Dilute hydrochloric acid, 15 minims.
Distilled water, up to 160 minims.

Five minims, one grain.—Ed.

This solution reddens litmus paper and preserves its limpidity without any precipitate for several months. Dr. Lente, of N. Y., uses the following:

℞ Sulphate of quinine, 10½ grains.
Dilute sulphuric acid, 18 minims.
Carbolic acid, 1 grain.
Water, up to 112 minims.

Sixteen minims = 1½ grains.

Out of 300 injections there were only two instances of abscess, and one of slough. One is naturally astonished at these results, with a fluid containing such a large proportion of acid, and in an amount which is more than enough.

The *carbolate* of quinine [which, however, is far from being a true chemical salt—Ed.] has been used by M. Maestro Perez in the treatment of cholera:

Carbolate of quinine, 5 grains.
Alcohol, up to 16 minims.

Three injections are given one after the other, in the first stage of cholera. [They should be intra-muscular instead of subcellular.—Ed.]

The *formiate* of quinine is fairly soluble, and has been used by Messrs. Namias, Lévi, and Calza. The *quinate*, *tannate*, *valerianate*, *hydrobromate*, *sulpho-vinate*, *bi-sulphate*, and *lactate* of quinine have been tried, but are not of sufficient importance for more than mention here.

The *carbamide-hydrochlorate* of quinine (a combidation of hydrochlorate of quinine with urea), which is soluble in its own weight of water, has been injected in a 50 per cent. solution by M. Jaffé, 16 minims being equivalent to 5½ grains of the quinine salt. The local reaction is, as a general rule, trifling, neither redness nor puffiness being observable. In doses of 16 grains, hummings of the ears are frequently observed, but only in women. In intermittent fevers its action is always uniform, and the paroxysms arrested after three or four injections. In typhus the temperature falls considerably after the injection of two or three syringesful. [Recently has come to my notice a claim made by several physicians that this salt produced frightful abscesses, sloughing, and septic poisoning. While it is more than probable that the hypodermic syringe was at fault, it is still well to observe extreme caution in its use.—Ed.]

Quinine has been extensively used subcutaneously by many physicians in the treatment of intermittent and remittent fevers, and in tubercular diseases; also in septicæmia, mania, neuralgia, cholera, infantile cholera, typhoid fever, acute and chronic articular rheumatism, sunstroke, convulsions, and pyæmia. However, the hypodermic mode of administration should only be practiced in cases of urgency, or when there is difficulty of administering by the mouth or rectum.

QUINODINA.—*Chinoidine*, or *Amorphous Quinine.*—The *hydrochlorate* is soluble in equal parts of water, and is readily absorbed, but may produce abscess. Heybom employed in hypertrophy of the spleen.

COCAINA—COCAINE AND ITS SALTS.

Extracted from coca leaves, this alkaloid occurs in the form of white colorless needles, sparingly soluble, of a faintly bitter taste. The *hydrochlorate* is of a *creamy* white color; crystallizes in rhomboidal needles, and dissolves readily in water. It produces local anæsthesia. Other physiological effects are: Dilatation of the pupils by paralysis of the filaments or the great sympathetic (Berthold); elevation of the temperature in small doses, lowering after large and poisonous doses (minimum or maximum of temperature variation one-half to one degree after injection) (Nègre); increase in pulse volume; increase in respiratory movements followed by irregularity; lowering, followed quickly by increase, of blood

pressure (Laborde); vertigo after doses of $\frac{2}{1}$ to $1\frac{1}{2}$ grains (von Anrep). In large doses is produced hyper-excitability, epileptiform convulsions (from its action on the brain and spinal cord), general analgesia and mydriasis (Moreno y Maïz, Rondeau and Glay, Laborde, Vulpian). According to M. Berthold, there is similarity of action between cocaine and atropine; injection into the jugular vein of an animal of $\frac{4}{1}$ to $\frac{5}{1}$ of a grain of hydrochlorate of cocaine, produces considerable fall of blood pressure without a previous rise. [Amyl nitrite is both antagnostic and antidotal to cocaine.—Ed.]

Solutions (4 per cent) of cocaine have repeatedly been made in and around tumors for their painless removal. Others have availed themselves of the same means in opening whitlows and abscesses.

℞ Hydrochlorate of cocaine (P., D. & Co.'s), 3 grs.,
Camphor water, 120 minims.
Dose 10 minims = ¼ grain.

Cocaine has been employed in the treatment of melancholia, dysphagia, migraine, odontalgia, hemicrania, etc. "Prof. Mosler obtained excellent results from the use of *salicylate* of cocaine in the treatment of asthma, employing $\frac{4}{1}$ of a grain of a 5 per cent. solution (Currie). [Personal experience does not altogether corroborate this. Ed.]

COLCHICINA—Colchicine.

℞ Colchicine, 1 grain.
Distilled water, up to 560 minims.
Sixteen minims for one dose = $\frac{1}{35}$ grain.

Injection causes sharp burning pain, and in a little more than 30 per cent. of cases signs of local inflammation also.

[This drug, and its derivative (*Colchicum seminis*), have long enjoyed an undeserved reputation in the treatment of both chronic and acute articular rheumatism, and also in neuralgia, including sciatica.—Ed.]

CONDURANGO.

[The injection of a *decoction* of condurango has yielded encouraging results in some few cases of gastric and œsophageal cancer, but the probabilities are the favorable manifestations were purely matters of coincidence. Bourneville and Bricon regard it as especially valuable in gastric catarrh, but here it is best administered *per orem* in the form of *wine*.—Ed.]

CONIINA. Coniine (Conicine).

Insoluble in water, it is freely so in alcohol and ether.

℞ Coniine, 1 grain.
Proof spirit, 120 minims.
Camphor water, 180 minims.
Dose, 5 to 10 minims = $\frac{1}{60}$ to $\frac{1}{30}$ grain,

The dose of *hydrobromate* should not exceed $\frac{1}{20}$ to $\frac{1}{5}$ grain, and possesses no local irritant action, which may occur with coniine. The latter is caustic as well as irritant.

℞ Hydrobromate of coniine, 1 grain.
Camphor water, 20 minims.
Dose, 1 to 3 minims.

Coniine and its salts have been employed as narcotics (Busch); praised in the treatment of convulsive cough, dyspnœa, laryngismus stridulus, various forms of asthma, spasm—tetanus, eclampsia, epilepsy, hysteria—and neuralgia (Tuloup, Tyriakan, Dujardin-Beaumetz); also in pulmonary emphysema, angina pectoris (Erlenmeyer, Lorent), pneumonia and pleurisy (Stewart), fever (Wertheim), blepharospasm (Eulenburg), whooping cough, bronchitis, spasmodic laryngitis (Méga), *tic douloureux* (Chaussier, Duméril), chorea (Welch, Harley), acute mania (Brown).

The physiological effects are most uncertain and variable: Dejection; sadness; general tremors; dyspnœa; rapid pulse; increase, then diminution, and finally loss, of reflex irritability; slowing of the pulse and respiration; analgesia; paralyzing action on motor nerves, which lose their excitability. The vagus nerve, which is the first to suffer, is also the first to recover. Pure coniine has no physiological action on the motor and sensory nerves. Respiration is most rapidly affected, the heart the last to die; the organs of sense, the digestive and calorific functions, are little affected (Tuloup); affections of sight; collapse; and death by asphyxia. The hydrochlorate and *hydrobromate* of coniine are stable salts, and their action is similar to that of coniine, but more energetic.

CONVALLARIA MAJALIS.—Lily of the Valley.

Convallaria majalis, recommended by various authors as a cardiac remedy, has been used hypodermically in a few cases by Dr. Andrew Smith. "Cases Illustrating the Action of Convallaria on the Heart" (Archives of Medicine, viii, p. 293).

[Farquharson (Woodbury) remarks it is a cardiac tonic and diuretic acting usefully in failure of compensation in mitral stenosis and regurgitation. Napheys claims it as an excellent substitute for digitalis, and adds, "a *fluid extract* such as is prepared by Parke, Davis & Co., may be administered (by the mouth) in fifteen or twenty drop doses every three hours until its effect is produced." Dr. Constantine Paul asserts it is a true heart tonic, but must be used in very large doses; Dr. S. T. Bruen, that in valvular diseases it is most useful in cases of mitral obstruction, but loses its effectiveness in proportion as fatty degeneration is present. "In advanced valvular heart disease, or cardiac failure, in the catarrhal nephritic forms of Bright's disease, convallaria, has not, however, proven as useful as digitalis." Margilano believes it increases the amount of urine.

That it is of great service in cases where palpitation and dyspnœa, rather than deficient cardiac systole, are the prominent features, is certain; it is especially valuable in phthisis or asthma in which palpitation and dyspnœa are prominent symptoms, before cardiac failure from advanced fatty change

ensues. Moreover, its effect is oftentimes brilliant in "purely functional heart disorder, especially palpitation with irregular cardiac action dependent upon general debility, and in cases of anæmia or hysteria. It is sometimes an efficient remedy in the irregular action of the heart caused by tobacco" (Napheys). The active principle is CONVALLAMARIN, a glucoside soluble in water.

℞ Convallamarin, 1 grain.
Glycerin, 40 minims.
Camphor water, 140 minims.

Dose, 5 drops = $\frac{1}{32}$ grain, cautiously increased, and not to exceed $\frac{1}{12}$.

Its physiological action is that it diminishes the number of pulsations while augmenting the amplitude of the contractions.

Albuminuria prevents or lessens its diuretic action. No cumulative effects have been observed.—ED.]

COTOINUM. PARACOTOINUM—
COTOIN. PARACOTIN.

[Cotoin and para-cotoin are to all practical purposes identical, save that the latter is one-fifth weaker in therapeutic value. Both are bitter crystals, soluble in boiling water, alcohol, ether, and chloroform, slightly so in cold water; anti-putrescent and anti-zymotic, and invaluable in the treatment of intestinal fluxes, except in some cases of ulceration, or of cirrhosis of the primæ viæ.

℞ Cotoin (or paracotoin, 6 grains), 4 grains,
Acetic ether to make 15 minims.

Dose, 15 minims repeatedly hourly (or even every 15 or 20 minutes), or as required, the injection made deeply.—Ed.]

Insoluble in the gastric juice, cotoin is freely so in the intestinal fluids, and acts by dilating the abdominal vessels, and lowering the temperature (Albertoni, Burkent).

[It is a stimulant alterative and stomachic, increasing the appetite, and specific in diarrhœas in that it modifies and restores the functional energy of epithelium, and stimulates pancreatic and biliary secretion.—Ed.] Fronmuller asserts it to be antisudorific, and Albertoni adds also it is anti-sialagogue, and both recommend in ptyalism and cholera, while M. M. Burkart and Jobst, who employed in the latter disease, suggest its combination with chloral [probably because coto has no effect on peristalsis, while chloral—or analgesin—are directly anæsthetic to the intestines.—Ed.]

Elimination is effected chiefly by the kidneys, and there is marked diminution of indican in the urine. [I have employed paracotoin in equal parts of glycerin and water.—Ed.]

CURARE or OURARI (*Strychnos toxifera.*) CURARINA.—Ourarine. Worara.

Ourari is soluble in water, in alcohol and water, insoluble in ether. *Ourarine* is deliquescent and readily soluble in alcohol and water. In doses of from

$\frac{1}{7}$ to $\frac{5}{7}$ of a grain, ourari, or curare, causes congestion of the brain; violent but transient headache; feeling of fatigue, apathy; increased salivary, lachrymal, sudoriparous and urinary secretions; glycosuria; pulse of greater force and frequency; more rapid respiration, and increase of temperature. In doses of $1\frac{1}{2}$ grains; rigors, frequent and feeble heart beats, increase of temperature, increase of secretions, distress, and affections of sight, paralysis of lower limbs, intense headache, no loss of consciousness or sensation, diminution of organic changes. The paralytic action is at first confined to the extremities of the motor nerves; in very large doses this effect extends to the intra-vascular extremities of the vaso-motor nerves. Death occurs from paralysis of respiration. Elimination is rapidly effected by the kidneys. The physiological effects of curare and curarine are identical, but the latter is the more powerful.

Antidotes.—Ligature above the wound by which the poison has been introduced; artificial respiration.

As the greatest uncertainty prevails as to the nature and source of the ourari used, it is quite essential to test that which it is proposed to administer. We have therefore to ascertain (1) the genuineness of the ourari (2) the degree of its activity—for the samples are never alike. It has been employed in tetanus (Vulpian, Follin, Lochner, Neudorfer, and others); epilepsy (Mandl, Benedict, Kunze, Du Cazal, Edlefrei, Bourneville and Bricon); chorea,

strychnine poisoning (Richter, Burow, Corona); convulsive *tic* (Gualla); meningitis (Landerberger). Curarine has only exceptionally been employed, by Busch and Reigel among others; the latter injected in a case of epilepsy, without effect, up to a dose of over 1/6 of a grain.

"According to Waring, the dose of curarine hypodermically is $\frac{1}{200}$ to $\frac{1}{100}$ of a grain. He says: 'That ourari controls the spasms of *tetanus*, is beyond question, but how far it is really effectual in promoting an actual cure has yet to be shown. The best mode is to inject hypodermically grain $\frac{1}{10}$ in aqueous (filtered) solution of the strength of 1 in 100.'" (Currie).

In injecting subcutaneously, it is best always to select a limb, in order not to lose the resource of ligating in case of accident. Among the local effects observed are: Swelling, pain, local and general rise of temperature, considerable redness, subcutaneous puffing, rosy-white elevation like urticaria (Voisin and Liouville, Du Cazal); painful swellings followed by abscess which persist perhaps several months, probably from the use of unfiltered solutions.

℞ Ourari, 1 grain,
Hydrochloric acid, 5 minims,
Distilled water to make 15 minims.
Dose 5 drops ($\frac{1}{10}$ gr.) carefully increased.

℞ Curarine, $\frac{1}{10}$ grain,
Cherry laurel water, 60 minims.
Dose 5 to 10 minims ($\frac{1}{200}$ to $\frac{1}{100}$ grain).

DIGATALIS.

[DIGITALIN, insoluble in water, fairly so in ether, and freely in alcohol and chloroform, is with such difficulty obtained in a perfect state of purity, that it is not to be recommended for general hypodermic use. I have, however, employed Parke, Davis & Co's hypodermic tablets, which are most reliable.

℞ Digatalin tablet $\frac{1}{100}$ grain, P., D. & Co.'s.
Diluted water, q. s.

For one dose.

℞ *Normal liquid* digitalis, P., D. & Co.'s,
20 minims.
Glycerin, 10 minims.
Camphor water, 30 minims.

Dose, 2 to 10 drops, used cautiously.

As a rule, digitalis preparations are not desirable to use subcutaneously, but the above and the *tincture* made from the normal liquid, are every way satisfactory, and less irritating than any other form. —ED.] Employed in heart diseases and mental maladies.

The physiological effects are: Diminution of frequency of the pulse-beats with increased arterial tension, fall of temperature, increased diuresis, diminished perspiration (Gubler). In poisonous doses the symptoms are reversed. Elimination is slow, and the effects are cumulative.

DUBOISINA.—Duboisine.

Duboisine is chemically and physiologically identical with hyoscyamine; soluble in water, alcohol, ether, chloroform, etc.

℞ *Sulphate* of duboisine, ½ grain.
Camphor water, 525 minims.

Dose, from 3 to 6 minims ($\frac{1}{350}$ to $\frac{1}{175}$ grain).

M. Dujardin-Beaumetz observed some toxic symptoms with daily doses of $\frac{1}{280}$ to $\frac{1}{440}$ in a solution of 1 to 2000, and therefore recommends a lapse of some days between injections; three drops also of a one-per-cent. solution in the conjunctival *cul-de-sac*, produced poisonous symptoms. It has been employed in the night-sweats of phthisis, asthma, and in exophthalmic goitre.

The chief physiological phenomena observed are: Mydriasis, dryness of throat, hyperæsthesia, quickened pulse, cephalalgia, vertigo, somnolence, general enfeeblement, arrest of sweat secretion; its action is the opposite of that of jaborandi, pilocarpine, and muscarine.

EMETINA.—Emetine.

Pure emetine, an alkaloid of ipecacuanha, is very sparingly soluble in cold water (1 in 1000) and in ether, but is readily so in alcohol, chloroform, and fixed and essential oils. The *nitrate* is soluble, 1 in 100 parts; the *sulphate* of emetine is the most soluble salt.

It does not appear to cause pain when administered hypodermically, but may induce slight induration.

℞ Pure emetine, 3 grains.
Sulphuric acid aromatic, 3 minims.
Distilled water, up to 48 minims.
Filter.

Dose, 1 minim ($\frac{1}{10}$ grain).

The human subject can tolerate considerable quantities of it, especially if injected in the subcutaneous cellular tissue; even to 3½ grains introduced several times. It is possible to obtain no poisonous effect from it—not even any inconvenience. The doses indicated as emetic by the hypodermic method by M. d'Ornellas are, on the other hand, very small, viz. from $\frac{1}{16}$ to $\frac{1}{14}$ grain. Foussagrives (*Formulaire Thérapeutique*, 1882) recommend a dose of $1\frac{1}{2}$ grains hypodermically; Dyce Duckworth, $\frac{1}{24}$ grains.

In doses of $\frac{1}{14}$ to $1\frac{1}{2}$ grains, it induces burning taste, salivation, nausea, vomiting, diarrhœa, profuse sweats. During the period of nausea and vomiting, first quickening, then slowing, of the heart-beats and of respiratory movements (Ackerman), with fall of temperature. In frogs there is loss of spinal reflex, irritability and paralysis of the peripheral motor nerves, and of the muscles (Weyland, Pécholier, Harnack).

In poisonous doses.—Extreme muscular debility, collapse and death ($\frac{2}{7}$ grain in a cat and $1\frac{1}{2}$ to $4\frac{1}{2}$ grains in a dog).

In emetic doses.—One-fourteenth to two-sevenths

of a grain (Nothnagel and Rossbach). According to Gubler, it is necessary to give not less than 3 to 4½ grains to produce the same effects as are obtained by 16 to 24 grains of powdered ipecacuanha.

ERGOTUM. ERGOTINUM. ERGOTININUM. ACIDUM SCLEROTICUM.—Extract of Ergot. Ergotin. Ergotinin. Sclerotic Acid.

[All preparations of ergot when employed hypodermically, cause pain and inflammatory symptoms, unless the injection is made deep into the muscular tissues, when there are no unpleasant local after-effects.

So-called ergotin and ergotinin are delusions, being merely *extracts* of ergot, hence the latter and sclerotic acid are all that demand attention.

℞ Purified ergotin, (ext. ergot), P., D. & Co.'s. Dose, 2 to 6 minims in water; represents 10 to 30 grains of ergot.

℞ *Normal liquid* ergot, P., D. & Co.'s (assayed), 5 to 30 minims, at one dose.

℞ *Acid sclerotic*, P., D. & Co., 18 grains.
Chloral hydrate, 3 grains.
Camphor water, 1 fluidounce.
Dose, 5 to 30 minims *plus*.—Ed.]

ETHER.

Sixteen to thirty-two minims may be used hypodermically; is sometimes employed as a diffusive stimulant. It may be diluted with water, 1 to 9.

Spirits of sulphuric ether, (Hoffmann's Anodyne), and acetic ether, have been employed as analeptics. It will be well to remember that ether dissolves the cement by which the joints of the average syringe are secured.

EUCALYPTOL.

Eucalyptol is soluble in alcohol, sparingly so in water.* It is an anti-fermentescent and anti-putrescent, and produces, in doses of from 32 to 64 grains, cephalalgia, physical and mental prostration, loss of reflexes, failure of respiration, fall of blood pressure and temperature. *In poisonous doses*, death occurs from arrest of respiration. *Therapeutics.*—Eucalyptus and its derivatives have been often used successfully, both internally and externally, in a great variety of diseases, but eucalyptol has only been administered subcutaneously by Dr. Sloan, who states that he has saved thereby the lives of patients suffering from severe puerperal fever (Kobner).

FERRUM.—Iron.

Dialyzed iron, diluted and undiluted, has been used by Da Costa in doses of 15 minims in cases of anæmia. M. Luton has injected it in doses of 3, 5, and 10 minims: "Deprived of its styptic and astringent properties, it is nearly as well borne by the cellular tissue as perfectly neutral solutions of morphine,

* See Vaselin, page 122.

is rapidly absorbed, and locally gives rise to nothing more than a trifling nodosity, which, however, persists for a considerable time. The immediate effects are similar to those of an energetic diffusible stimulant; a sense of warmth more agreeable than painful is diffused throughout the body, the arteries pulsate strongly, the countenance is flushed, there is increased mental activity, rapidity of thought, and desire for exercise. These effects last some time, proportionately to the dose injected, and are never followed by prostration, but by a certain degree of anorexia." M. Luton has also observed a re-awakening of the generative desire.

The *pyrophosphate of the ammonio-citrate* has been employed by Hugenin, Neuss, Lippert, and others, but it is by no means certain that it is not apt to induce abscess.

℞ Pyrophosph. of ammon.-cit. iron, 3 grains.
Distilled water, up to 16 minims.
Sixteen minims equal approximately ⅓ grain of iron.

This solution should be made as required, and kept in a cool place. Iron is detected in the urine thirty minutes after injection.

GELSEMIUM. Yellow Jessamine.

Gelsemium paralyzes the motor centres of the brain and the respiratory centres (Berger, Moritz, Ott); it first increases then diminishes reflex excitability of the spinal cord and the cardiac contractions.

These symptoms are complicated with weight of head, vertigo, diplopia, impeded movements of the tongue, tremor of the hands, numbness of the fingers, nausea, vomiting, dyspnœa, feeling of general cold (Berger). The medicinal doses range from $\frac{1}{100}$ to $\frac{1}{40}$ grain of GELSEMINE, and from 1 to 5 drops of the *normal liquid.*

Hydrochlorate of gelsemine, P. D. & Co., 1 grain.
Distilled water, up to 210 minims.

From 2 to 5 minims, equivalent to $\frac{1}{140}$ to $\frac{1}{70}$ of a grain of salt; it produces insensibility at the point of injection.

[The *normal liquid* is every way preferable to the alkaloid, and may be given diluted with glycerin, alcohol, or glycerin and camphor water.—ED.]

It has been successfully used in the treatment of neuralgia by Drs. Jurasz, Wickham Legg, Thomson, Clarke, G. A. Stockwell, and others. The hydrochlorate is ten time as active as the *gelsemin*, or concentration, and is a permanent salt.

HYDRARGYRUM—PREPARATIONS OF MERCURY.

Bi-chloride of mercury is soluble in 6 parts of cold water, and freely soluble in alcohol, ether, and glycerin. *Cyanide* of mercury is soluble in water (5 per cent.), and dilute alcohol; slightly soluble in strong alcohol, and in glycerin. *Bin-iodide* of mercury is insoluble in water and in glycerin, soluble in al-

cohol and in ether. In *small doses*, according to some authors, mercury is stimulating and restorative as well as antiseptic. In medicinal doses it has no appreciable effect on the formation of urea, but it is generally admitted that its *prolonged* use is attended, with diminution of globulin.

Physiologically it produces stomatitis more or less speedily according to idiosyncrasy or local predisposition, salivation, intestinal catarrh, diarrhœa; often notable slowing of the circulation and fall of temperature. Mercurial fever is generally due to local irritations produced by these preparations (Barrallier). When pressed to procure chronic mercurialism, it is a brain poison, one of the most constant phenomena being a condition of timidity and embarrassment, falling out of the teeth, shrinking of the gums, chronic inflammations of the mouth and pharynx, induration of the salivary glands and of the cervical ganglia, gastric catarrh, pains in the limbs, nervous excitability, insomnia, vertigo, tremors, impairment of memory, frequently emaciation, dental neuralgia, headache, dyspnœa, tinglings, anæsthesia and analgesia.

℞ Corrosive sublimate, 1 grain.
Distilled water, up to 168 minims.

Dr. Lewis injected 12 minims of this solution, to which he sometimes added morphia and glycerin. Or the formula may be made:

℞ Corrosive sublimate, 2 grains.
Muriate of morphine, 1 grain.
Camphor water, to make 1120 minims.
Dose, 5 to 20 minims.

M. Bergh, of Stockholm, never met with suppuration or other accidents after hypodermic injections of sublimate, and he attributed this immunity to methodical massage of the nodule resulting from injection immediately after its production. He advises that injections should be made into parts richly provided with cellular tissue.

M. Plevani adds hydrochlorate of cocaine to the solution to render the injection painless, and chloride of sodium to prevent the precipitation which would otherwise ensue from the formation of an insoluble double chloride of mercury and cocaine.

℞ Bi-chloride of mercury, 3 grains.
Hydrochlorate of cocaine,
Chloride of sodium, ää 1 grain.
Distilled water, up to 336 minims.

Sixteen minims = $\frac{1}{7}$ of a grain of mercury salt, and $\frac{1}{21}$ of a grain of cocaine.

Martin has used bin-iodide of mercury subcutaneously.

℞ Bin-iodide of mercury, 4 grains.
Distilled water, up to 112 minims.

Some add 4 grains of potassium iodide to effect solution, forming a double iodide of mercury and potassium. Dose, 2 to 4 minims.

Bi-cyanide of mercury, when employed, has usually been followed by infiltration of the cellular tissue, lasting a week.

℞ Cyanide of mercury, 1 grain.
Distilled water, up to 224 minims.

Dose, 4 minims ($\frac{1}{56}$ grain). According to Lagelouze, it causes diarrhœa, vertigo, and dizziness.

M. Martineau employed a mercuric *peptonate* 16 grains of which are equivalent to four grains of sublimate (bichloride of mercury 160 grains, dried pepsin 240 grains, and 240 grains of ammonium chloride). The hypodermic solution is is very stable, and prepared thus:

℞ Peptonate of mercury ammon., 1 grain.
Neutral glycerin, up to 96 minims.

The *glycocholate* of mercury is also used subcutaneously, and is made by dissolving $1\frac{1}{4}$ grains of glycocolic acid in a few drops of distilled water, to which $\frac{1}{2}$ a grain of mercuric oxide is added. After filtration, distilled water is added to bring the solution up to 56 or 112 minims. Sixteen minims are equivalent to $\frac{1}{7}$ and $\frac{1}{14}$ grain of mercury respectively.

The *formiamidate* of mercury has been regularly used by the hypodermic method with benefit in the clinic of M. Neisser of Breslau, in over 200 cases of syphilis. The injections, into the gluteal muscles, are made slowly, and the portion injected is afterwards subjected to systematic massage.

There are few subjects in regard to which there

is greater contrariety of opinion than that of the utility of subcutaneous injections of mercury for syphilis. Dr. Buzzard concludes it is safe with ordinary care as regards the formation of abscesses, and that the necessary mercury is absorbed into the system. He believes it, however, to be a painful mode of treatment, even when the injection is made in the back, and the solution employed quite clear. He is disposed to think that it possesses no advantages over mercurial inunctions in cases of gummatous syphilis, or when there is evidence of internal disease, except perhaps the very problematical one of substituting a clean but painful process for one which is as dirty as it is free from personal suffering. In this opinion Messrs. Hill and Cooper coincide.

Baümler, while admitting that subcutaneous injections made with due precautions, beyond the pain which they occasion, need give rise to no local troubles except in unhealthy persons, thinks that the method is not so rapid in its effects as appears at first sight, the rapid disappearance of the external symptoms of syphilis being by no means equivalent to a cure of the disease itself. He also quotes the observation of Zeissl, to the effect that there is more apt to be recurrence of syphilitic manifestations after hypodermic than any other form of medication. Later observers, among others Villar, Florez, and Schultz, speak highly in praise of anti-syphilitic hypodermic injections. The two former authorities recommend

injections of mercuric peptone and of cyanide of mercury, and state that the latter salt is especially useful in cases of ocular, cerebral, and medullary syphilis. They claim that hypodermic medication possesses the advantages over treatment by internal administration or by inunction, of being more exact in regard to dosage, in not giving rise to gastro-intestinal troubles, in shortening the duration of treatment, and in rarely causing ptyalism. Schultz uses a combination of mercuric *chloride* with *urea*.

Scarenzio, Ambrosoli, and Sigmund, used hypodermic injections of *calomel*, by means of a finely levigated powder held in suspension in water and glycerin, in various syphilitic affections. Maximum dose, ¾ grain.

Calomel, 3 grains.
Glycerin, up to 16 minims.

M. G. Smirnoff treated syphilis successfully by hypodermic injections of calomel. He employed solutions of one-half the strength of those employed by Scarenzio and others, with the object of avoiding abscess.

"M. Boni was much pleased with the results obtained by injections of calomel in croup; ¾ grain in the left arm of a child" (Currie).

HYDRASTININA.—Hydrastinine.

[Hydrastinine in pure condition is perfectly white, and melts in the test tube at 116° to 117° C.; is soluble in alcohol, ether, and chloroform, with extreme

facility; more difficultly soluble in warm water, and with most of the acids readily forms soluble salts. The *hydrochlorate* is readily soluble in water; the solution exhibits slight fluorescence, possessing, with the free base, an intensely bitter taste. In both warm-and cold-blooded animals, it paralyzes by means of its action on the motor sphere of the spinal cord; a tetanic stage is not produced. It increases the contractile power of the heart muscle. *It is not a cardiac poison.* It has no local effect on the muscular tract. Vascular contractions are produced by its action on the vessels themselves, resulting in increased blood-pressure, which, in the beginning, is periodic, quite pronounced, persistent, and not interrupted by any symptoms of relaxation. Concurrently with the increase of blood-pressure, is observed an irritation of the vagi, which produces a slowing of the pulse. At death, the lessening of blood-pressure is of a secondary nature not dependent upon a relaxation of the blood-vessels, and removable by means of artificial respiration. Death ensues in consequence of paralysis of the respiratory centres.

The above, showing the absence of irritation of the spinal nerves, the favorable action upon the heart, and persistent contractility of the vascular system, is convincing that hydrastinine is better suited for therapeutical employment than hydrastine —the active principle of *Hydrastis Canadensis.* On the other hand, the absence of an action on the mus-

cular portion of the tissues, is a powerful argument for the subcutaneous injection of this remedy.

Dr. Falk, after an injection in his own person of 1 gramme (16 drops) of a five per cent. solution, subcutaneously in the fore-arm, was convinced that it is not any more painful than cocaine. Directly after its use, in the neighborhood of the puncture there is a feeling of cold and insensibility, otherwise nothing either subjective or objective; never any abscesses, though it is not always possible to avoid infiltrations that cause temporary swelling. These local effects disappear speedily, however, being disconnected with any sensation of pain.

Dr. Falk summarizes his experiences with the product as follows:

In cases of metrorrhagia, wherein hydrastinine was employed, in which anatomical lesions were absent, the remedy established its usefulness decidedly. In congestive dysmenorrhœa, menstruation progressed during its use without the occurrence of congestive troubles; the hæmorrhage was much decreased, and the period shortened. Equally good results were obtained in the metrorrhagia of virgin uteri. In all cases in which menstruation occurred every fourteen days and with a duration of from eight to twelve days, hydrastinine shortened the period to five days, with an interval of from five to five and a half weeks, with a notable increase of strength.

In cases of pyosalpinx, hydrastinine was very

serviceable, relieving the congestions of the genitals and decreasing the amount of hæmorrhage. In cases of metrorrhagia due to endometritis, and, in those complicated with chronic metritis, there was decided improvement. In all cases menstruation had been previously very irregular; in several, intercurrent hæmorrhages, in others menstruation, occurred at intervals ranging from fourteen days to three weeks, lasting for a long time, naturally weakening the patient by loss of blood and other concurrent causes. These hæmorrhages had been treated by repeated abrasion of the uterus, and by ergotin, but without result. In all, the intercurrent hæmorrhages desisted, menstruation became regular, and lasted but a short time, with a notable improvement of attendant symptoms. Women who usually were too weak to perform any work during the menstrual period, declared that after the injections they had gained sufficient strength to indulge in their usual avocations, and did not require the same amount of rest as formerly; and the improvement was permanent.

Execellent results were obtained in cases of myoma of different characters and sizes, in all of which there was more or less hæmorrhage. After a few injections, the hæmorrhage, which usually lasted from four to eight weeks, and had proven uncontrollable by ergotin, became only a slight loss of blood; and there was a consequent lessening of debilitating influences.

Out of twenty-six patients of the foregoing classes treated with hydrastinine, only four were not either improved or cured. The successful results can, therefore, be summed up as giving 84.6 per cent. of the cases.

A critical summary of cases, leads to the inference that those in which menorrhagia preponderate (also those of congestive dysmenorrhœa), and mild attacks of endometritis, define the boundaries of this treatment. It is not unlikely also that hydrastinine can exert a contractile effect on the vessels, and by that means influence the character and quantity of hæmorrhage; and it is also possible that it is an excitant or stimulant to the muscular structure of the uterus. In evidence of this position, may be adduced the fact that pains resembling those of labor, and slight hæmorrhages, ensue after its injection, principally in cases of endometritis.

Dr. Falk frequently began its use during hæmorrhage, and found in cases of endometritis even after the first injection, a cessation of the flux; also in cases of myoma, after several injections. The most satisfactory results were, however, obtained in cases of congestive dysmenorrhœa, or too profuse menstrual hæmorrhage dependent upon structural changes of the uterus, when the treatment was adopted from six to eight days before the expected occurrence of the menstrual flow. In cases of irregularity, he injected every other day, or perhaps two to three times a

week, .05 gramme (¾ grain) of hydrastinine, using the following formula:

℞ Hydrastinine muriate, 1 gramme (15 grains).
Aq. dest., 10 grammes (150 gtt.)
S.—For subcutaneous injection.
Dose, 7 to 15 minims.

As an experimental feature, Dr. Falk made use in the injections of a quantity reaching up to .15 gramme (2¼ grains), but speedily discovered that these large doses offered no advantages over those previously employed, representing from .05 gramme (¾ grain) to 0.1 gramme (1½ grains) of the salt. No bad results, however supervened after the larger injection.

It may be remarked, that while the price of hydrastinine is at present rather high, the very moderate quantities require—during each month not exceeding over 1.0 gramme (15 grains) for each patient—do not preclude its employment for economical reasons. —Ed.]

HYOSCYAMUS.—Henbane.

Hyoscyamine is an alkaloid nearly identical with duboisine and daturine*; unlike the latter, it causes no intermittence or arrest of the heart, nor convulsions, but it does induce carbuncles and emaciation. Elimination is chiefly by the kidneys. It is partially antagonized by eserine. [Neither it, the *tincture*, or

* See *Atropine*, page 35.

the *normal liquid*, produce any local effect, and the latter is oftentimes the preferable preparation for subcutaneous use. Dose of hyoscyamine, $\frac{1}{100}$ to $\frac{1}{4}$ (!) grain daily; of tincture, 10 to 40 minims; normal liquid, 3 to 10 minims, cautiously increased.

℞ Normal liquid hyoscyamus, 30 minims.
Glycerin, 10 minims.
Camphor water, 20 minims.
Dose, 5 to 20 minims.—Ed.]

℞ Hyoscyamine, 1 grain.
Distilled water, 560 minims.
Dose 8 to 40 minims *plus*. (*Eulenburg.*)

M. Pitha reports that after a dose of $\frac{1}{12}$ grain he observed, almost at once, bodily enfeeblement. [The best forms for hypodermic administration are, the normal liquid above mentioned, and the tablets of Parke, Davis & Co.—Ed.]

The preparations of henbane have been employed in alcoholic and senile tremors (Oulmont, Eulenburg); obstinate chorea (Richter); mania (Mendel, Reinhard, Gray, Sepilli, Riva, and Richter); epilepsy (Reinhard, Laurent, Sepilli, and Riva); in the period of excitement in general paralysis, in locomotor ataxy and sclerosis (Lawson); lumbago (Laurent); paralysis agitans (Bourneville). Mr. Engledue Prideaux administered both by mouth and subcutaneously in cases of mania with changeable delusions, with marked benefit; in monomania and pure melancholia, without much benefit; and with good results in mania of suspicion,

even if accompanied by depression; in ordinary epilepsy; and in delirium tremens. Currie says henbane lessens the delusions and cuts short the attacks. He adds "that in all cases of mental excitement, including acute mania, hysterical mania, and puerperal mania, it is the only reliable hypnotic that we have."

HYOSCINE is a somewhat glutinous material, and yields crystalline salts, the principal of these being the *hydriodate*, the *hydrobromate*, and the *hydrochlorate*. Experiments have been made with the two former, the hydrobromate being mostly used [and every way the most preferable as it is had in permanent colorless crystals.—ED.]

Hyoscine acts as a spinal, and centric respiratory depressant; it affects the circulation slightly, and does not paralyze the pneumogastrics. In poisonous doses, although it paralyzes the vaso-motor system, it has very slight depressant influence on the heart. In the healthy human being, the effects of a medicinal dose are: Ten minutes after subcutaneous injection the symptoms resembled those of slight alcoholic intoxication, viz., sense of lightness and giddiness; these were succeeded by dryness of the mouth and throat, and restlessness, in spite of giddy sensations. Then followed drowsiness and profound sleep, on awakening from which there was no recollection. In one gentleman who accidentally took a small dose of a strong solution, there were symptoms of weight of the eyelids, constrictive headache (chiefly frontal), sense of suffocation without dyspnœa, great uneasiness and

unrest, with intervals of unconscious sleep. On recovery, the after-effects were limited to slight headache and feeling of lassitude. It is of little use to relieve pain, but of great value in spasms, and is contraindicated in patients with a tendency to pulmonary œdema. Also is of great service in the treatment of delirious excitement and insomnia, in insanity, and other diseases; has been found useful in controlling the delirium of pneumonia, cardiac and renal disease, epileptiform convulsions and chorea. Prof. Edlessen administered it in six cases of whooping cough, with advantage in three; in six cases of asthma, always with advantage; and in two cases of severe enteralgia, with relief of pain. It has been extensively used by alienists with unmistakable benefit in cases of acute dementia, mania, melancholia, hystero-epilepsy, and other mental diseases. It is, however, "only a temporary remedy to quiet delirium and control excitement, and does not cure the various diseases in the course of which delirium arises" (Currie).

It is best administered hypodermically, the doses ranging from $\frac{1}{200}$ to $\frac{1}{100}$ of a grain, and in some cases to as much as $\frac{1}{75}$ or $\frac{1}{50}$ of a grain. Dr. Mitchell Bruce has given as much as $\frac{1}{25}$ of a grain of the hydriodate without injurious effects, but as a general rule this dose is unsafe, and even with $\frac{1}{100}$ of a grain Dr. Nestor Tirard observed, in a case of chronic Bright's disease, angry and combative delirium.

℞ Hydrobromate of hyoscine, 1 grain.
Camphor water, 200 minims.
Dose, 1 minim = $\frac{1}{200}$ grain.
6 00

ICHTHYOL.—Sulpho-Ichthyolic Acid.

A brownish yellow oil soluble in water, and recommended by Unna in the treatment of skin diseases; he also recommends it internally for acute and chronic rheumatism. Although chiefly used as an external application, it has been employed also subdermically, in 16 minim doses of a 5 to 10 per cent. aqueous solution. [After all, ichthyol is simply a very soluble preparation of *sulphur;* being a powerful antiphlogistic, rapidly producing anæmia of all the tissues to which it is applied, it must not be permitted to touch abraded surfaces. Unna says it is indicated internally in doses of from 30 to 60 grains.—Ed.]

IODOFORMUM.—Ter-Iodide of Formyl.

Insoluble in water, soluble in alcohol (1 in 50), in ether (1 in 6), in fats, volatile and fixed oils, vaselin, chloroform, and carbon sulphide.

The etherial solution of iodoform has been used with success in severe cases of arthritis, by Messrs. Miculiecz, Neumann, Müller, etc. Elimination is slow, yet its presence is speedily detected in the urine. 1½ drachms have been injected in thirteen days. It has been successfully employed in syphilis, but chiefly internally and externally in goitre, scrofula, rickets, phthisis, anal fissure, prostatic enlargements, neuralgia (Moretin), uterine and mammary carcinoma (Demarquay), serous collections, chronic arthritis, glandular enlargements (Gubler), cancerous and vener-

eal ulcers (D'Amico), to stimulate sluggish wounds, in varicose and phagedenic ulcers, rupia and ecthyma, inter-digital mucous gummata, suppurating buboes, moist gangrene, gunshot wounds (Féréol), intermittent fevers (Knotts), toothache due to caries (Lailler, Marrotte.)

℞ Iodoform, 6 grains,
Glycerin, up to 24 minims.
From 4 to 10 minims of the solution.
(*Thomann.*)

℞ Iodoform, 1 grain,
Almond or castor oil, up to 16 minims.

The effect subdermically is, local and general anæsthesia, antisepsis, vomiting, nausea, epigastric pains, diarrhœa (Maillard, dose 7 grains). [The fact is, it is of little value subdermically.—Ed.]

JABORANDUM.—Jaborandi.

[Hypodermic injections of Pilocarpine salts, or even of the *normal liquid* jaborandi properly diluted, so far as the writer can discover, has never been attended with any accident or untoward result not due to the physiological activity of the drug exclusively.—Ed.] The physiological phenomena include congestion of the skin, principally of the face; increase of secretions, especially of the salivary and sudorific glands; acceleration of cardiac pulsations; initial increase of temperature, sometimes persistent if diaphoresis is not established, with consecutive fall in accordance with the greater or less abundance of perspiration. In medic-

inal doses the salts of pilocarpine are less apt to produce nausea, vomiting, diarrhœa, and that sense of extreme lassitude, which frequently result from the use of jaborandi; and it may be observed that in doses of less than $\frac{2}{1}$ grain the unpleasant effects resulting from administration of the salts, have for the most part been observed in patients suffering from cardiac affections.

℞ *Muriate* (or *nitrate*) of pilocarpine, 2 grains.
Distilled water, up to 160 minims.
Dose, 5 to 10 minims *plus* ($\frac{1}{16}$ to $\frac{1}{8}$ grain).

In is usually best to begin with a small dose and increase cautiously; when it exceeds $\frac{1}{4}$ grain, it is advisable to administer in two or more portions—one-half in the morning, the other in the evening. [I have never given hypodermically more than $\frac{1}{2}$ grain, though Bourneville and Bricon admit employing $\frac{3}{4}$; the former dose sometimes secures profound exhaustion. One-eighth grain introduced in the arm during the cold stage of intermittents, invaribly, in my hands, aborted both chill and fever, sweating at once supervening; and I have found both pilocarpine and jaborandi invaluable in treating obstinate (chronic) cases of ague.—Ed.]

Injections have been specially used in the treatment of various forms of dropsy, in pleurisy, bronchitis, pneumonia, acute articular rheumatism, epilepsy, eclampsia, mercurial poisoning (Prokop, Rokitansky), unilateral sweats (André), fœtid perspira-

tion of the feet (Armaingaud), rapidly progressive posterior sclerotico-choroiditis with muscæ volitantes and threatened detachment of the retina (Dehenne, Deniau), detachment of the retina (Dianoux and others), some forms of polyuria (Roques, Huchard and Ducroux), syphilis (Lewin), diphtheria (Lehwess and Guttmann); [hypopion, Henry Williams, C. B. Stockwell—Ed.]; also to assist uterine contractions; in uræmic coma, asthma, puerperal convulsions, cholera; and to relieve the pains of tabes dorsalis. "An interesting case of cure of alopecia from pilocarpine injections is recorded in the *Lancet*, vol. i., 1882. Brünauer has used it with success in a case of tetanus of rheumatic origin; M. Chéron has injected ¾ of a grain daily as a galactagogue, with complete success in eight out of nine cases; Dr. Purjeck cured a case of atropine poisoning, and Dr. Roth, a case of stramonium poisoning, by hypodermic injections of pilocarpine." (Currie.)

There is an unmistakable antagonism between pilocarpine and belladonna or atropine.

MOSCHI TINCTURA.—Tincture of Musk.

M. Rosenthal praises musk highly as a diffusible stimulant in the algid stage of cholera, and in adynamic forms of typhoid fever. M. Rhode used an aqueous solution (1 in 40), of which he injected from 16 to 48 minims *per diem*, according to the gravity of the case. In most of the cases a rise of pulse-rate and of temperature resulted.

Locally, he observed on one occasion a slight slough of the skin in a case of cholera, and in another instance there was induration without abscess. Musk and its tincture have lately been used by various writers, among others by Vogelsang, in the treatment of infantile convulsions. Tincture of musk, made in the proportion of one part of pure pod musk and twenty-five parts each of alcohol and water, is injected in doses of from 5 to 30 minims.

MUSCARINA.—Muscarine.

Has been employed hypodermically by Ringer and Morehead, who gave in doses of ⅓ to ¾ grain. M. Prevost has suggested that it might be possible to antagonize the toxic symptoms due to atropine by hypodermic injections of muscarine, physostigmine, or pilocarpine, in moderate doses; he proved a natural antagonism between muscarine and atropine by experiment. It has been used with success in the night-sweats of phthisis, and to arrest the secretion of milk. [Muscarine *sulphate* is very hygroscopic; dose hypodermically $\frac{1}{100}$ to $\frac{1}{75}$ grain.—Ed.]

NICOTINA.—Nicotine.

Nicotine was employed hypodermically by Erlenmeyer in a case of tetanus, without local trouble and with good results, in doses of $\frac{1}{70}$ of a grain. [Is an excellent antagonist to strychnia.—Ed.]

℞ Nicotine, 1 grain.
Chloroform water, up to 280 minims.
Dose, four to eight minims = $\frac{1}{70}$ of a grain.

NITRO-GLYCERINUM.—Glonoin. Trinitrin.

An inodorous, yellow oil of mawkish taste, but slightly soluble in water, though readily so in alcohol or ether. It is a powerful poison, and in moderate doses (1 to 6 drops of a 1 per cent. solution) produces a feeling of intercranial fullness, more or less severe headache, confusion or sluggishness of thought, tinnitus aurium, vertigo, amblyopia, quickening of pulse rate with occasional dicrotism, diminution of arterial pressure, redness and flushing of face, sweats, nausea, vomiting, and occasional exaggeration of the respiratory movements. In *poisonous* doses (excess of six drops) clonic and tonic convulsions succeed, followed by death from asphyxia. The effects closely resemble those of amyl nitrite, but are more persistent.

Glonoin has been administered internally in neuralgia, epilepsy, and hysteria, by Thorowgood, James, Laurence, Baker Edwards, Brady, and others. In consequence of the experiments of Fuller, Harley and Vulpian, who disputed the results obtained by the above mentioned authors, glonoin fell into disrepute for several years, but after the publication of M. Bruel's essay, was again used by Murrell, Mayo-Robson, Craig, Farquharson, Stitls, McCall Anderson, Green, Hammond, Stewart, Korcinski, Huchard, Trusevich, and Bramwell, in angina pectoris, acute and chronic nephritis, epilepsy, eclampsia, asthma,

palpitation, affections of the heart and aorta, syncope, migraine, neuralgia, vertigo, Menière's disease, and epileptiform *tic*. "In addition it has been employed with marked benefit in seasickness, the vascular tension which occurs in the aged, myxœdema, and puerperal convulsions" (Currie).

In regard to some of these ailments, the results obtained are contradictory. Glonoin appears to be mostly of use in angina pectoris, and in those diseases in which cerebral anæmia is a symptom. Quite recently M. Rossbach has recommended its use subdermically in the treatment of interstitial nephritis.

℞ Nitro-glycerin solution, 1 per cent., 5 drachms.
Rectified spirit, 2 drachms.
Distilled water, up to 1½ ounces.
Dose, 1 to 4 minims. One minim contains $\frac{1}{240}$ of a grain.

NUX VOMICA.

Nux vomica increases the tactile sensibility, causing tinglings, salivation, anxiety, vertigo, rapid breathing, and stiffness of nuchal muscle; tetanic spasms in rapid succession, merging into one another, with opisthotonos and forcible extension of the lower limbs and of the trunk; trismus from the action upon the bulb and spinal marrow; dilitation of pupils, elevation of blood pressure, abolition of energy of the motor nerves, slowing of cardiac pulsations; death by asphyxia, arrest of heart, and unascertained modification of the nerve centres.

STRYCHNINE is very sparingly soluble in water, alcohol and ether, but its salts are all soluble, and more toxic than the alkaloid; the *muriate* and *nitrate* are more active than the *sulphate*. Strychnine is also possessed of decided antiputrescent and antifermentative properties, and is not generally admitted to possess cumulative action. The salts administered hypodermically do not cause any local trouble save that sometimes erection of the hair follicles (goose skin) is observed at and near the point of puncture.

According to Husemann, the minimum lethal dose of strychnia is $\frac{1}{2}$ grain. It should at first be administered in very minute doses ($\frac{1}{120}$ to $\frac{1}{60}$), cautiously increased until the appearance of toxic phenomena (stiffness of muscles of neck, spasms, etc.), when the administration must be suspended. *Antagonisms:* Calabar bean (Watson,and Keyworth), chloral (Liebrich,Rajewsky), chloroform inhalations (?). A pseudo-antagonism exists between strychnia and curarine. [Dr. Currie remarks: "Urethan is alleged to be nearly as efficient and much less dangerous an antagonist than chloral. Dr. Bignon concludes, from experiments made upon dogs, that cocaine is a physiological antagonist to strychnine; up to a certain point after the ingestion of poisonous doses, the animal could always be saved by hypodermic injections of cocaine, but when too large doses were administered it always perished from the correspondingly large doses of cocaine required." —ED.]

℞ Nitrate of strychnine, 1 grain.
Distilled water to make 300 minims.

Dose, 5 minims ($\frac{1}{60}$ grain).

℞ Sulphate of strychnine, 1 grain.
Dilute sulphuric acid, 3 minims.
Distilled water to make 300 minims.

Dose, 5 minims ($\frac{1}{60}$ grain).

Nux vomica and strychnine have been recommended in the treatment of delirium tremens; and Dolbeau advises $\frac{1}{10}$ of strychnine sulphate injected around the anus *in divided doses*, every two days, in the rectal prolapse of children. Luton advises:

℞ Sulphate of strychnia, 1 grain,
Cherry laurel water, 105 minims,
Distilled water, up to 210 minims.

Fifteen minims = ¼ of a grain: an injection every half hour until four have been given, after that every hour; he says the dose should reach $\frac{2}{7}$ to $\frac{4}{7}$ of a grain. Parke, Davis & Co.'s hypodermic tablets contain either $\frac{1}{100}$ or $\frac{1}{50}$ of a grain as desired.

Tincture of nux vomica has been employed hypodermically in threatened asphyxia from catarrh, in the death agony, and in the last stages of adynamia, in doses as high as 80 minims (Luton), with no local effects save slight swelling, heat, and moderate pain, all of which soon disappear. [*Normal liquid* is preferable to the tincture however, and oftentimes to the alkaloidal salts, for hypodermic use, and may be employed in doses of from 1 to 5 minims.

Brucine, another alkaloid of nux vomica, has in general the same physiological action as strychnine, with local anæsthetic effect superadded. It might be employed with advantage in combination with many preparations that cause intense pain when administered hypodermically, being preferable for this purpose to cocaine. It is soluble with the aid of heat in dilute alcohol, and may be given subcutaneously in doses of from $\frac{1}{60}$ to $\frac{1}{20}$ of a grain.—Ed.].

All these preparations have been employed in: Paralysis of the vocal cords, of the crico-thyroid muscles (Waldenburg, Neudorfer), saturnine palsy (Lorent), hemiplegia, paraplegia, paralysis from compression of radial nerve, Bell's paralysis, hemeralopia, amaurosis, writer's cramp, urinary incontinence, intestinal atony, lightening pains of tabes, [brucine is preferable.—Ed.], sciatica, pulmonary emphysema, cholera, chloral poisoning, diphtheritic paralysis, infantile paralysis, progressive muscular atrophy, and locomotor ataxia. Maestro Perez suggests injections of 4 to 5 minims of a two-per-cent. solution in the second stage of cholera.

["Atropine has been employed to antagonize the poisonous effect of strychnine; two cases were successfully treated by Dr. Roberts, in one of which the strychnine was administered in whiskey. Gubler says that possibly atropine is antagonistic, but Bartholow strongly combats this view, asserting the atropine only intensifies the effect of the poison, and hastens

deatb hy contributing to the tetanic fixation of the muscles of respiration, an opinion confirmed by Mc Reddie. The latter also believes that amyl nitrite is antagonistic to strychnia, an idea that is probably fallacious, as suggested by the experiments of St. Clair Gray and Dr. Barnes. Dr. H. A. Hare finds that amyl prolongs life, but that its action is so fleeting that it can only be employed to tide the patient over until other remedies can be administered. Phyostigmine, chloroform, chloral, all have been claimed as antidotes, but the evidence is no way clear upon this subject." (Currie). [It would be desirable to know the effect of glonoin, as its action is analagous to that of amyl, and more permanent.—Ed.].

"Strychnine administered hypodermically has been found of the greatest value in cases of cardiac failure. The experiments of Dr. T. Lauder Brunton, and Dr. Cash, show that this drug stimulates the motor ganglia of the heart; and the former authority states that the action of strychnine on the motor centre of the heart is probably similar to its action on the vasomotor and respiratory centres. Dr. Herbert Habershon points out that in this respect strychnine differs from alcohol, ether, ammonia, and digitalis, which are to a large extent muscle stimulants. Hence why, in some cases, strychnine succeeds when other stimulants fail. He recommends the hypodermic use of strychnine in the following classes of cases: 1. Where the feebleness of the heart's action de-

pends primarily upon an acute lung affection, such, for instance, as in some cases of acute pneumonia, or a case of renal disease in which a sudden œdema of the lung supervenes accompanied by rapid and feeble action of the heart; in these the double action of strychnine on heart and lungs renders it of especial value: 2. In cases of cardiac disease where, by the primary affection of the heart, the arterial system is unfilled, the great nerve centres in the brain suffer from a want of nutrition, and are, so to speak, starved: 3. In a third class of cases the feeble action is due to a reflex cause (also in the course of cardiac disease); for instance, shock produced by exhaustion, by a local cause such as embolus in the brain, by extreme cold, or emotional excitement or fright.

"*Arseniate* of strychnine is claimed to possess the properties both of arsenic and strychnine in combination; it is readily soluble in glycerin and water, easy of absorption, and produces no local disturbance when given subcutaneously." (Currie.)

℞ [Arseniate of strychnine, 1 grain.
Glycerin,
Distilled water, of each equal parts to make 320 minims.

Dose should begin with five, gradually and slowly increased to 20 minims ($\frac{1}{64}$ to $\frac{1}{16}$ grain).—Ed.]

"It possesses powerful antiseptic properties, in virtue of which it is of the highest value in the early

stages (prodromata) of acute infectious diseases; when administered in the initial stage of infectious fevers, it overcomes the symptoms of general malaise, muscular lassitude, etc., and the patient experiences relief even after a single injection. Dr. Russell has found the drug of special use in the treatment of typhoid fever, which disease, he asserts, it aborts in the early stages, or simplifies when administered after the fever is fully developed; and he attributes these effects to the power which the remedy possesses of 'sterilizing, as it were, the soil on which the pathogenetic micro-organisms of typhoid fever vegetate.'" (Currie.)

OLEANDRINA.—Oleandrine.

This alkaloid, extracted from the leaves of *Nerium oleander*, is one of the group of cardiac poisons, and has been administered subcutaneously by Erlenmeyer without success in epilepsy.

℞ Oleandrine, 10 grains.
Alcohol, q. s.
Distilled water to make 120 minims,
Dose, 12 minims.

OLEUM AMYGDALÆ. OLEUM OLIVÆ—Almond Oil. Olive Oil.

According to M. Binz, these oils have been used subcutaneously as nutrients, but without success on account of difficult absorption by the cellular tissue. [Shoemaker, of Philadelphia, claims to have

used it in a number of cases with encouraging results, but his statements are to be accepted *cum grano.*—ED.]

Krueg has injected four to eight drachms of olive oil per diem in the case of a lunatic who refused food. The injection fluid being expelled slowly, caused no pain, and left only a trifling redness.

OPIUM.

[Opium has a much more decidedly stimulating effect than morphine on the cardio-vascular apparatus; it raises the pulse, at the same time increasing the amplitude of the pulse wave, and it stimulates also, in the most marked way, the calorific function. The *normal liquid* of Messrs. Parke, Davis & Co., is an excellent preparation for hypodermic use:—ED.]

MORPHIA alkaloid is almost entirely insoluble in water, sparingly soluble in alcohol, ether, chloroform, and glycerin, and insoluble in essential oils.

[The *hydrochlorate* is soluble in 16 to 25 parts of water, 50 parts of alcohol, and to the extent of 20 per cent. in glycerin. The commercial *sulphate* is an undesirable salt for hypodermic use, and is less soluble than any other form, the *meconate* excepted. The *acetate* ranks next to the hydrochlorate, and contains 80 per cent. of morphia alkaloid to only 76 found in the sulphate.—ED.]

In medicinal doses morphine causes somnolence, muscular enfeeblement, sensorial troubles, contraction

of the pupils, mental torpor; diminution of sensibility and of muscular contractability co-existing with increased reflex excitability; dryness of mouth and throat with thirst, impairment of appetite and of gastric digestion; constipation, nausea, vomiting; more or less profuse perspiration; itchings, excitement and alarm on awakening. In larger doses there are suggestions in thought and movement, succeeded by comatose sleep; the pulse is either slow or of unwonted frequency; respiration becomes irregular, and sometimes falls in number to eight or ten per minute; the mucous membranes become cyanosed; the countenance is pallid, and covered with violet colored patches; the temperature falls; and death finally supervenes, frequently amidst clonic and tonic spasms. *Morphinism* produces dryness of the mouth, thirst, nausea, vomiting, generally constipation, occasionally dyspnœa and palpitation [a combination rare and unusual—Ed.], albuminuria, loss of power, amenorrhœa, insomnia with hallucinations, varying disposition, hyperæsthesia, neuralgia, tremor of hands, bewildered and stupid expression; various forms of eruptions, loss of appetite, tendency to suppuration, emaciation; these phenomena are more prominent after the sudden abandonment of the morphine habit.

Man is, of all animals, [the dog excepted,—Ed.] the most sensitive to the action of morphine, hence it is necessary to be on guard against the error of judging the effects likely to arise. Besides, in man

the effects vary with age, constitution, etc. Children, for instance, are extremely susceptible to the influence of morphine. The lethal dose in individuals who are not habituated to its use, varies within very wide limits; hence with such it is wise to begin with a minute dose ($\frac{1}{16}$ grain for example), and increase cautiously. Morphine is *eliminated* with considerable rapidity by the kidneys. The *local effects* are *nil* when the injection is skillfully made.

Solutions of morphine hydrochlorate in water alone, become turbid very quickly, and form *apomorphine* with irritant properties. To obviate this difficulty, waters distilled from eucalyptus globulus (Gubler), peppermint, and cinnamon, have been proposed, (Delioux and Savignac); also glycerin, alcohol, alcohol and water (Adrian and C. Paul), distilled elm-water (Patrouillard), weak chloral solution (Vidal), a solution of salicylic acid, 1 in 2,000 (Limousin, Keyes, etc.), carbolic acid; cherry laurel water also has been employed, but it rapidly oxydizes by exposure to the air, when the solution causes pain.

℞ Morphine hydrochlorate, 12 grains.
Chloral, 15 grains.
Camphor water, up to 480 minims.

—Ed.]

℞ Morphine hydrochlorate, 1 grain.
Chloroform water, 40 minims.

Five minims of either of these solutions represents ⅛ grain.

—Ed.]

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℞ Sulphate of morphine, 12 grains.
Sulph. acid, 2 minims.
Distilled water to make 480 minims.
Five minims ⅛ grain. ED.]

℞ Acetate of morphine, 12 grains.
Acetic acid, 1 minim.
Chloral hydrate, 2 grains.
Pure glycerin, 1 drachm.
Distilled water, q. s. to make 480 minims.
Dissolve the morphine after mixing with the acetic acid, with half an ounce of water, then add chloral hydrate, and last of all the glycerin mixed with balance of water; filter—5 minims ⅛ grain of morphine.—ED.]

The use of morphine has become so extensive and universal, that it is administered now-a-days in all sorts of ailments, rightly and wrongly. It is impossible to protest too strongly against this abuse, as morphine and its salts should never be prescribed except in well-defined cases. Morphine injections have frequently been used in the treatment of cholera. Dr. Walter Coles, recommended morphine before the period of collapse, combined with atropine in the intermediate stage, and atropine alone in the stage of collapse. (See Belladonna.)

[It is a pity hypodermic tablets of morphine muriate and acetate are not in the market.—ED.]

PAPAVERINE has been employed hypodermically by Messrs. Leidesdorf and Schüle, in cases of insanity, in the form of *hydrochlorate* or *phosphate* (six to twelve minims of a 1 in 12 solution); the phosphate produced abscess and sloughing.

Apomorphine Hydrochlorate.—This differs from morphine in having one less equivalent of water; the hydrochlorate alone is employed.

℞ Hydrochlorate of apomorphine, 2 grains.
Camphor water, 100 minims.

Dose, 2 to 8 minims (Currie).

A few drops of muriatic acid may be added when concentrated solutions are made, to clear them up. It dissolves with difficulty in cold water, but rapidly in warm; the solution after the lapse of a few moments assumes a green tint, and is apt to be unstable, hence it is best made fresh as required. [Messrs. Parke, Davis & Co.'s hypodermic tablets are invaluable for this purpose.

Hydrochlorate of apomorphine should only be used with the utmost caution in consequence of the peculiar tendency to syncope and collapse which it induces in some subjects. The majority of works on therapeutics, and the formulæ of many authors, give as the emetic dose $\frac{1}{4}$ up to $\frac{1}{4}$ of a grain, but the latter is decidedly dangerous. Indeed no emetic has given rise, (regard being had to the frequency of its use,) to so many cases of collapse and syncope. In one case $\frac{1}{15}$ grain caused great prostration (Currie), and $\frac{1}{18}$ must be deemed sufficient for an adult if of good quality.—Ed.]

Its action is directly on the nerve centres, exciting vomiting, and not, as is generally imagined, reflex (David). Feeling of weight at the epigastrium, slight

headache, acceleration of pulse and respiration, salivation, perspiration and nausea, precede emesis. Though chiefly prescribed as an emetic, diaphoretic, and expectorant, it has also been employed in gastric diseases and obstruction, various forms of poisoning;* in threatened asphyxia, croup, pneumonia, tonsilitis, broncho-pneumonia; layrngismus stridulus, foreign bodies in œsophagus, mania, hystero-epilepsy, angina tonsillaris, diphtheria, epilepsy. Hypodermic injections procure no pain worthy of mention, and no local disturbance except possibly small subcutaneous indurations which rapidly disappear.

Codeine.—The *hydrochlorate* of codeine, which is usually employed hypodermically, is soluble in 80 parts of water, in alcohol, and in ether.

℞ Hydrochlorate of codeine, 2 grains,
Distilled water, 160 minims.
Ten minims = ⅛ grain.

Phosphate of codeine is soluble in 4 parts of water and contains 70 per cent. of codeine; it should be administered in double the dose of morphine. "Codeine has been used in gastrodynia, cancer, and

* As morphine delays the development of the action of apomorphine, and as chloroform and chloral injected intravenously delay the action until awakening occurs, it would be useless—nay more, *dangerous*—to administer hydrochlorate of apomorphine in poisoning by morphine, chloral, and chloroform, owing to the time which would be lost, if the poisoning were sufficient to produce anæsthesia and muscular relaxation (David).

insomnia. It is very useful in some forms of cough, and particularly so in diabetes. In one case of obstinate bronchial asthma, I have found it more effectual than any other drug in quieting the paroxysms and inducing sound refreshing sleep." (Currie). Erlenmeyer employed it in neuralgia without apparent benefit; Reissner in mental diseases in doses of $\frac{3}{4}$ to $1\frac{3}{4}$ grains. Very exceptionally there are inflammatory troubles at the point of injection. [Recently has been widely heralded as a specific in yellow fever; and certainly its physiological characteristics favor the claims made.—Ed.]

Apocodeine and Aponarceine are little employed.

℞ **Hydrochlorate of apocodeine, 3 grains.**
Camphor water, up to 224 grains.
Dose, 15 to 25 minims.

The effect is produced in a few moments, without fatigue to the patient, and the therapeutic properties generally are those of apomorphine, but in less degree (Dujardin-Beaumetz). The *hydrochlorate* of aponarceine is an emetic, but not in use.

PARALDEHYDUM—Paraldehyd.

Paraldehyd is a polymeric modification of aldehyd; is soluble in water (1 in 10), less soluble in hot water than in cold; is a hypnotic in doses three times as large as of chloral. According to M. Peretti it exercises no injurious action on the heart, even in large doses; the hypnotic effect is produced rapidly, with-

out a stage of excitement or of congestion; the number of pulse beats is generally diminished; the respiratory movements are slowed down; the temperature falls; and the secretion of urine is diminished (?). Nausea, vomiting, and vertigo have sometimes been observed after its administration. In large doses, sensibility and reflex movements are abolished, and death takes place from arrest of respiration. It exerts its action on the cerebral hemispheres, the medulla, and the spinal cord. There is an antagonism between strychnine and paraldehyd. (Dujardin-Beaumetz).

At first used as a hypnotic, it has more recently been employed as a sedative in mania, melancholia, etc.

℞ Paraldehyd, 10 minims.
Cherry laurel water, 10 minims.
Distilled water to make 40 minims.
Dose, sixteen minims (= 4 minims of paraldehyd).

It is necessary, before using this solution, to take the precaution of plunging into hot water—not to increase its solubility, but to prevent crystallization and ensure its being in a fluid condition.

PEREIRINA—Pereirine.

From *Pao-pereira** bark, in repute in South America as a tonic, febrifuge, and alterative. It exists in the form of a yellowish, non-crystalline, inodorous

* *Geissospermum Vellozii*, Allem.

powder of bitter taste; is sparingly soluble in water, but dissolves in ether, alcohol, or chloroform. It undergoes changes at very high temperatures—100° C. and upwards. The PEREIRINE of commerce is an impure product; of its salts, the *hydrochlorate*, *sulphate*, and *valerianate* are the only ones which have as yet been used therapeutically.

For hypodermic purposes the neutral hydrochlorate alone is capable of being used with advantage; it crystallizes in quadrangular prisms of a vermillion tint, soluble in all proportions in water. Like all pereirine salts it has an intensely disagreeable bitter taste, but no local irritant action; it abolishes the functional activity of the central grey nervous substance, and more especially of the grey matter of the medulla and spinal cord (abolition of voluntary movements, afterwards of the reflexes, and finally of the excitability of the motor and sensory nerves).

[One of the numerous substitutes for quinine, it is almost unknown in Great Britain and the United States, but in the West Indies is possessed of no small popularity as a febrifuge and antispasmodic, and employed hypodermically as well as *per orem*.—ED.]

In medicinal doses it gives rise neither to intellectual nor sensorial troubles, its influence on the circulation being trifling and irregular.

℞ Hydrochlorate of pereirine, 1 to 2 grains,
Camphor water, up to 30 minims.

Dose, 15 minims in each arm.

It produces only slight inflammatory phenomena —redness, pain either spontaneous or excited—which quickly disappears; no scars are produced.

PICROTOXINUM—Picrotoxin.

Picrotoxin, obtained from the seeds of *Menispermum Cocculus*, is not an alkaloid; it forms, however, with bases and alkaloids, chemically distinct salts. It is sparingly soluble (1 in 150) in water, freely soluble in boiling alcohol, and in ether. In poisonous doses causes convulsions; it acts specially on the bulb, and probably on the whole extent of the spinal cord (Glover, Planat); its action on the cerebellum and corpora quadrigemina (Glover) is far from being proved.

Gubler has used picrotoxin hypodermically in doses of $\frac{1}{40}$ of a grain in labio-glosso-laryngeal paralysis, and obtained, after the lapse of some days, marked improvement; locally it produced persistent induration. Westbrook used it subcutaneously, with benefit, for the night sweats of phthisis, in doses of $\frac{1}{140}$ to $\frac{1}{48}$ of a grain; it entirely checked the sweats in six cases, and afforded great relief in two. "It was found in some cases that $\frac{1}{20}$ of a grain, hypodermically, at night, would control the sweats for ten nights following." Dr. Murrell also obtained good results, but with much smaller doses—he administered from $\frac{1}{180}$ to $\frac{1}{60}$ of a grain, and had only one failure in twenty cases" (Currie).

POTASSIUM BROMIDE AND IODIDE.

[Both are wholly inadmissible for hypodermic use, in spite of the fact that Bourneville and Bricon give place to them in their work. It is claimed the *bromide* acts as a hypnotic in small doses, but this from personal experience I am prepared to deny.—Ed.]

POTASSII PERMANGANAS—Permanganate of Potassium.

Hypodermic injections have been recommended in the treatment of the bites and stings of venomous reptiles and insects; also in diphtheria, for which Dr. Brown claims it as a specific. It is likely to prove of value in some forms of acute rheumatism.

Permanganate of potassium, 1 grain,
Distilled water, 120 minims.

Dose 15 to 60 minims. [In bites of venomous creatures, ligature the limb above the wound. The solution must be made fresh at the moment it is required.—Ed.].

QUINOLINUM.—Quinolin and Derivatives.

Quinolin is an artificial base closely related to the cinchona alkaloids. It is insoluble in water, soluble in alcohol, ether, chloroform and benzol. The *tartrate* and *salicylate* are stable salts; the former readily soluble in water; the latter in 80 parts, and in alcohol, ether, vaselin, glycerin and fixed oils.

The physiological phenomena induced are: Marked fall of temperature, diminution of irregularity

of respiratory movements, gastric disorder (nausea, vomiting) noises in the ears, sometimes feeling of pressure on the nucha. In *poisonous* doses, frequent respirations, finally loss of reflex excitability, total paralysis, and death—frequently with hyperæmia and œdema of lungs. These salts are antiseptic, and among the many cheap substitutes for quinine.

The tartrate, *hydrochlorate* and *citrate* of quinolin are the only salts used for hypodermic injections, and are painful, and often followed by extensive infiltration of the cellular tissue. The tartrate is preferable for this purpose; is of a dull white color, has a distinctive odor, and a taste analagous to that of bitter almonds; is soluble in alcohol, and insoluble in ether. The medium dose hypodermically for an adult is from 3 to 16 grains. Quinolin salts have been used with varying and uncertain results in intermittent fever, neuralgia, typhoid fever, whooping cough, tuberculosis, pneumonia, erysipelas, and septicæmia. Currie frequently used tartrate of quinolin, by internal administration, as an antipyretic in pneumonia and erysipelas. Its effects on the pulse, as tested by sphygmographic tracings, and on the temperature, closely resemble those which follow on the administration of kairin.

KAIRIN is a yellowish-white synthetic crystalline derivative of quinolin, very soluble in water and alcohol, slightly so in glycerin, insoluble in ether; it is a *hydrochlorate of oxy-ethyl-quinolin.* An anti-putres-

cent, it slows the pulse and respirations, lowers arterial tension, and diminishes temperature by vaso-motor dilatation. There is a diminution of general sensibility and motility in proportion to the amount of the dose; convulsions, contractures, pupillary contraction and paresis, occur only after large doses. Profuse sweats coincide with fall of temperature, and rigors with its rise; there may be cyanosis, hæmaturia, and diminished excretion of urea. The respiratory capacity of the blood is diminished with reduction of hæmaglobin to methæmaglobin. Elimination is effected by the kidneys with dark-green discoloration of the urine.

M. Querole used hypodermically in doses of 1⅛ to 8 grains in 14 minims of water. These injections did not give rise either to local or general ill-effects. The same author states that at the ordinary temperature, kairin will only dissolve to the extent of 1½ grains in 16 minims of water. Stronger solutions can be prepared by gradually raising the temperature of the water, which will remain clear at a temperature of 95° F. Deep injection is necessary. Kairin has been mostly used as an antipyretic, but the unpleasant effects, such as profuse perspiration and rigors, to which it gives rise, and the very temporary influence it exerts on the temperature, render it less useful than the cinchona salts.

Analgesin. A powerful antipyretic derived from quinolin, with properties identical with kairin, though

its action is more prolonged and intense. Also an antiputrescent and hæmostatic. It arrests fermentation in yeast, and germination. It has been claimed, beside a moderate amount of perspiration, vomiting, and pharyngeal constriction, that it produces no markedly objectionable effects; that collapse never arises from its administration. [This last, however, has recently been unequivocally proven false, and we now know that the drug is apt to prove dangerous even in moderate doses. Being a *patented* medicine, advertised in the secular press as a panacea, the less the medical profession have to do with "*antipyrin*," the better.*—Ed.]

Used by a great many observers, it has chiefly been employed in the treatment of the symptom "fever." Ranke was the first to use it hypodermically. [Made in the gluteal region, it has been claimed that injections cause only transient pain without any inflammatory reaction, but Erb, Hoffer, and Huchard gave up the use of hypodermic injections on account of the intense suffering induced.†—Ed.]

**Analgesin* is unpatented antipyrin, and identical in every way with the latter, at half the price. So, too, *Acetanilid* is unpatented antifebrin.—Ed.

[† Dr. L. Bach, from a study of one hundred cases of various diseases of a neuralgic character, says:

1. Subcutaneous injection of analgesin as regards the production of local pain, is of the most varied action, the result evidently depending upon the individual disposition of the

THALLIN also is derived from quinolin. All the salts readily dissolve in water, but the *hydrochlorate* readily undergoes change by exposure to the light. The *sulphate*, which is generally employed, dissolves in five times, and the *tartrate* in ten times, its weight of cold water. *Ethylthallin* and its salts are equally soluble in water.

Jaksch employed these salts (and the *hydrochlorate* of ethylthallin in doses of $3\frac{1}{2}$ to $10\frac{1}{2}$ grains) as antipyretics. The fall of temperature was considerable, amounting to several degrees, but sweats frequently occurred coincidently therewith, succeeded by rigors and an ultimate rise in temperature; also have been observed increased blood pressure and fall of

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patient. 2. No difference between the first and subsequent injections can be made out. 3. Whenever possible, the injection should be made into the tissue of the muscles, since in this locality it is, at any rate, no more painful than in the subcutaneous tissue, and infiltration is avoided. 4. Previous injections of cocaine are to be recommended. 5. As recommended by Liebreich at the last Wiesbaden Congress, the injection should be made as near as possible to the seat of pain. An apparent exception to this rule is found in the fact that in hemicrania and orbital neuralgia, relief will frequently follow with astonishing rapidity the use of injections into the deltoid muscle. 6. There is no probability of analgesin ever being regarded as a substitute for morphine. 7. Injections of analgesin arrest pain in hemicrania and muscular pain, especially in lumbago and neuralgia of the sciatic and trigeminal nerves. In most cases the relief is permanent; in others it lasts six to eight hours. 8. In articular rheumatism it seems to be almost

pulse and respiration; collapse never occurred. The minimum of temperature was reached in from two to three hours after exhibition of the drug, which, further than this, exercised no influence on the progress and duration of the various diseases for which it was prescribed.

The effects produced by thallin last longer than those obtained from kairin, and it is more active than analgesin, and the dose is smaller and rarely induces vomiting (3½ grains of thallin = 16 grains analgesin). In doses of seven grains, thallin does not produce any symptoms in a healthy man, and all its salts arrest fermentation. Elimination is by the kidneys. Messrs.

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a specific, as, in the single case in which it failed to give relief, failure can be regarded as attributable to the complications existing in the case. 9. No difference is evident as regards its influence upon acute or chronic pain; it appears to act equally well in both cases. 10. Five cases in which chills, cold sweat, palpitation of the heart, and symptoms of syncope followed its use, show that its employment should be carefully watched, although in no cases were the symptoms severe enough to cause any anxiety. Since in none of these cases was cocaine injected with the analgesin, the results are attributable to the latter alone. 11. Only in the rarest instances will these injections fail to produce some improvement.

In most cases Dr. Bach employed a solution of analgesin made in boiling distilled water. In other cases he employed a solution consisting of 150 grains each of analgesin and water, in which 3 grains of cocaine were dissolved, the latter solution being ordinarily less painful in its employment. —Ed.]

Brouardel and Loye have demonstrated it has the same *modus operandi* as kairin, and acts, namely, by destruction of the hæmoglobin.

M. Grocco, of Pavia, used *acetate* of thallin, which he found was a powerful antipyretic in doses of 4 grains. The symptoms observed after its use were: Profuse sweats, and diminution in the frequency of the pulse and respirations. In some cases where there was intolerance of the drug, he administered without inconvenience by the hypodermic method in doses of 1½ grains. The average duration of the action of this salt varied between four and six hours. M. M. Mingazzini and Pisenti used the *sulphate* and *tartrate* in water hypodermically, the latter declaring them "perfectly safe."

℞ Sulphate of thallin, 3 grains.
Distilled water, up to 16 minims.

As there is a precipitate from this solution in the cold, it is necessary always to use it warm; it does not cause abscess or other local accident. In a dose of 1½ grains, which is equivalent to 4 grains administered *per os oris*, the lowering of the temperature reached 2·1° to 2·3°, C. and persisted for a period of six to nine hours.

"Prof. Jaccoud considers thallin the most valuable antipyretic we possess, and states that by its systematic use in small doses, it is possible to maintain a permanent condition of apyrexia in febrile cases."—(Currie.)

QUINONUM, HYDROQUINONUM — Chinon, Hydrochinon.

Quinon is a benzol derivative very sparingly soluble in cold water, but more so in alcohol and ether. It is isomeric with resorcin and causes rapid fall of temperature, a dose of 3 grains securing an immediate depression of 0.5°. Doses of 6 to 9 grains produce the same result with greater certainty, and at the same time effect a diminution of the pulse. In doses of 12 to 16 grains symptoms of excitement are observed, but these are transitory. Its ready solubility and non-irritating character make it suitable for hypodermic use, its injection never causing more pain than an injection of pure water.

Hydroquinon, 10½ grains,
Hot distilled water, up to 112 minims.

32 minims=3 grains of the salt.

[It is stated that 3 grains of hydroquinon reduces the temperature very quickly without any unpleasant effect. Dr. Currie recommends that 5 to 10 minims of a *warm* 10 per cent. solution should be injected into each arm. "Dr. Siefert praises it highly as an antipyretic, and says that no ill effects follow from repeated doses, so that fever may be kept down by it continuously and methodically." This statement is open to question. It has no disagreeable taste and is readily taken by children.—Ed.]

RESORCINUM. Resorcin.

Isomeric with hydroquinon and *pyrocatechin;* dissolves to almost any extent in water, and is also soluble in ether, alcohol, glycerin, and vaselin; is insoluble in chloroform and carbon sulphide. Aqueous solutions when exposed to air and light soon acquire a brownish color, without appreciable alteration, according to the degree of concentration. It possesses practically the same properties as carbolic and salicylic acids, but its toxic effects are less than those of the former.

Resorcin brought in contact with albuminous substances, causes immediate coagulation forming an *albuminate* of resorcin. Slightly concentrated solutions are possessed of caustic properties, causing opacity, with white discoloration of the cellular and muscular tissues; it sometimes also produces noises in the ears and vertigo. Elimination is chiefly by the kidneys, and rapidly performed.

℞ Resorcin, 5 to 20 grains.
Distilled water, up to 112 minims.

Dose, 10 minims (⅔ to 3 grains), which do not give rise to local trouble.

In inveterate sciatica, intramuscular injections in a 10 or 20 per cent. solution, often produce healthy local derivation. A 5 per cent. solution has been used hypodermically by M. M. Bogusch, Stibnewski, Ugo Basse, and Cattani, without ill results, and with claimed definite and rapid effects.

"Dr. Murrell found that a dose of ℥ ij of resorcin administered in one dose to a young woman who was suffering from asthma, produced alarmingly toxic phenomena. She was, in a few minutes, in a profuse perspiration from head to foot; there was complete loss of voluntary power and reflex action, the pulse at the radials was weak and thready, and the temperature in the axilla only 94° F. Restoratives were applied, consciousness was soon restored, and the temperature gradually returned to the normal. Dr. Andrew first used hot baths as restoratives, but latterly has had recourse to the vintages of Bordeaux and Burgundy, and finds that under the influence of these stimulants the toxic symptoms speedily vanish. Dujardin-Beaumetz, who was the first in France to use resorcin, has entirely discontinued its internal administration; he says that he was led to abandon its use in rheumatism and typhoid, not only on account of its powerlessness, but also on account of the toxic phenomena to which it gave rise. 'While recognizing the fact that resorcin is not so poisonous as carbolic acid, I came to the conclusion that it was a dangerous remedy as an antipyretic, for I observed in patients suffering from typhoid fever who were treated thereby, the same depression of the vital powers, the same adynamia, and the same pulmonary congestion, which I had previously seen in patients who had been treated by carbolic acid.'" (Currie).

SCILLIAINUM AND SCILLIPICRINUM.

Scilliain or Scillitoxin and Scillipicrin.

Glucosides from squill, the first with the same action as digatalin when injected hypodermically; the second has been employed in the same way as a diuretic.

℞ Scillipicrin, 1 grain.
Distilled water, up to 12 or 60 minims.

Dose, ⅓ to ½ grain of the active principle.

SODIUM SALTS.

The hypodermic injection of saline solutions causes sharp suffering followed by induration, and sometimes even by abscess, though Bertin and Gray state that when preceded by an injection of atropine sulphate, common salt does not cause pain.

Injections of Sodium Chloride are sometime administered in the treatment of neuralgia, sciatica, lumbago, angina pectoris, torticollis, and muscular spasms. M. Lubanski has administered in the diarrhœa of phthisis to aid appetite and digestion, and never saw local accidents result. A 1 to 20 solution has been used for hypodermic transfusions. [Has been used in cholera, and Bright's disease, also with claimed satisfactory results.—Ed.]

Iodide of Soda is preferable to potassium iodide for hypodermic use, the dose being about one-third that administered by the mouth.

Lactate of Sodium, which was proposed by M. Preyer as a hypnotic, has been used subcutaneously in doses of nine grains. Experiments made, show that this salt at best has but a feeble and uncertain action, while hypodermic employment causes intense pain.

Salicylate of Sodium is supposed to arrest fermentation and prevent putrescence, but Kolbe and others deny this action. It causes slowing both of circulation and respiration, and lowers the temperature and blood pressure. In large doses causes copious perspiration, nausea, vomiting, and tinnitus aurium. In poisonous doses, causes convulsions and asphyxia from paralysis of the respiratory centre. Elimination is effected by the kidneys. It must not be forgotten that salicylate of sodium is contra-indicated in alcoholism, cerebral lesions, cardiac adynamia and renal diseases.

According to Messrs. Domingos and Freiré, with the exception of ecchymosis, local troubles are very rare if the drug is sufficiently diluted; hence, when it is desirable to inject a large dose, this must be done by means of several punctures—M. Collard had to discontinue its use owing to the local injury to which it gave rise. These authors recommend in yellow fever in doses of 16 to 24 grains and upwards in the first, and 1½, 2, and 3 grains in the second stage.

℞ Salicylate of sodium, 4 grains.
Camphor water, up to 15 minims.

Salicylate of sodium should be perfectly neutral, and the solution should be made (and filtered) only as required. Caffeine is sometimes associated with benefit.

Gubler used GLAUBER'S SALT hypodermically, but without producing purgation. Luton used 1½ grains in 16 minims of water, with slight laxative effect.

SOLANINA.—SOLANINE.

The therapeutic properties of this alkaloid have only recently been studied. It is obtained from potato shoots, and also from the parings of very young or very old potatoes. Solanine belongs to the same class of poisons as atropine, eserine, and pilocarpine, and forms salts with acids. The *hydrochlorate*, which is a gelatinous body readily soluble in water, may be given in doses ranging from one to three or four grains daily. Dr. Genenil regards it as a narcotic to the medulla, spinal cord, and nerve-trunks, and as a paralyzant to the terminal ends of sensory and motor nerves. It does not produce cerebral congestion, but in poisonous doses is said to affect the cerebral cortex, causing headache, delirium, cyanosis, and somnolence. It is best administered hypodermically, as it is apt, when administered by the mouth, to cause nausea, vomiting, and a desire to defæcate; it does not produce the unpleasant after-effects which are apt to follow upon the administration of morphine, and it it has no cumulative action.

Solanine may be prescribed to combat excitement, spasm and pain. It has produced excellent results in the treatment of sciatica and rheumatic neuralgia, and has proved of service in the treatment of gastritis, acute dyspepsia, the vomiting of pregnancy, bronchitis, bronchial asthma, cardiac asthma, and emphysema. It has been used in cystitis, prurigo, and in some nervous affections in which restlessness and insomnia were prominent symptoms. It may be safely prescribed for young children and old persons" (Currie).

SPARTEINA.—SPARTEINE.

Sparteine is an oily fluid alkaloid extracted from *Cystisis scoparis*, the shoots of which contain a non-alkaloidal principle, SCOPARIN. In physiological properties they are supposed to closely resemble coniine.

℞ Sparteine sulphate, 2 grains.
Distilled water, 112 minims.

The diuretic effects appear after doses of $\frac{2}{7}$ of a grain (16 minims of solution).

℞ Scoparin, 6 grains.
Glycerin, 30 minims.
Distilled water up to 120.

Dose, 5 minims (= ¼ grain).

STRAMONIUM.

DATURINE, chemically identical with atropine, is sparingly soluble in water (1 in 283), freely so in alcohol, less so in ether. It is antagonized by eserine.

"According to Waring, daturine may be given hypodermically (in acute mania) in doses of $\frac{1}{120}$ to $\frac{1}{60}$ of a grain, but is less useful than atropine or hyoscyamine" (Currie.) The *extract* of stramonium is usually preferred, as it possesses no local effect.

℞ Extract of stramonium (P., D. & Co. *assayed*), 1 gr.,
Camphor water, up to 80 minims.
Dose, 5 to 20 minims, $\frac{1}{16}$ to ¼ grain.

It has been employed in preliminary emphysema (Lorent), neuralgia (Oulmont and Laurent), tetanus, shaking palsy and various forms of tremor.

In small doses it produces dilatation of the pupils, dryness of throat and mouth, dysphagia, intense thirst, slight increase of pulse and respirations, increased blood pressure, increased intestinal contractions, elevation of temperature not necessarily constant, heaviness of the head, slight excitement with tendency to movement (the legs are unsteady and give way), lassitude, occasional delirium, profound sleep; also may induce visual troubles, erotic dreams, pricking sensations and tremor. A *larger* dose produces a condition analogous to drunkeness; the visual troubles are decided, the iris completely invisible (never amblyopia); also dysphagia, dryness and burning of the throat, hoarseness of the voice, sometimes absolute aphonia, rapid respiration which becomes jerky and sighing, rapid cardiac action, fall of temperature and of arterial tension, intestinal paralysis, pallor, and chilliness with clammy sweats of the extremities. Some-

times, from the beginning, hallucinations, general convulsions, frequent desire to urinate, with or without spasm, coma, urgent thirst, and headache on awaking. In *very* large doses, the phenomena resemble intermittents, and there is arrest of the heart beats; peripheral sensibility is only blunted in poisonous doses. Daturine exerts its action especially on the great sympathetic; in small doses it diminishes the capillary circulation—in strong doses it determines vascular paralysis (Oulmont and Laurent.)

TAYUYA.

[Tayuya, the root of *Trianosperma ficifolia*, is a drastic purgative and emetic, excitant to the lymphatic system, and an active depurative. The Italian physicians use also as a bitter tonic, and ascribe to it almost magical properties. M. Ambrosoli used the *tincture* (1 in 4 of proof spirit) hypodermically, in doses of six to fifteen minims, in cases of constitutional syphilis, and observed only a very trifling local reaction. Prof. Gamberini began with the tincture diluted with half its bulk of water, and then used injections of undiluted tincture; a dose of sixteen minims was well borne, but gave rise to a hard indolent swelling. Many other Italian physicians, following these observers, have used tayuya with success, especially in scrofula. Dr. Eulenburg, who has experimented with the tincture of M. Ubicini, has not found any real benefit to result from its use in

full doses; Messrs. Geber, Concetti, Pelizarri, Marcacci, Zanarelli, Rasori, and Zeissl obtained similar negative results, while Prof. Sigmund, of Vienna, found that tayuya was not only inefficacious but positively injurious. TAYUAYIN (the *trianospermin* of Peckolt) is a drastic, purgative principle.—ED.]

TEREBINTHINÆ OLEUM—OIL OF TURPENTINE.

Pure oil of turpentine, has been administered hypodermically in doses of sixteen minims by M. Luton, but without success, in a case of obstinate sciatica; it caused intense pain, and was followed by abscess. Turpentine injections have been used successfully in the treatment of carcinomata, sarcomata, and other neoplasms, by Vogt. [It should be remembered that turpentine in large doses in damp or cold weather tends to supply fuel for the evolution of animal heat rather than to exert any therapeutic action.*—ED.]

URETHAN.

An ethylic ether of carbaminic acid. "It occurs in the form of white crystals, free from odor, and is readily soluble in water. Von Jaksch considers it peculiarly suited for administration to children, and most useful in simple uncomplicated insomnia, though apt to prove inefficient when there is acute pain.

"Although as much as 30 to 60 grains may be

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* See Vaselin, page 123.

given to adults, Dr. Saundby obtained good results from the exhibition of 2-grain doses in cases of cardiac insomnia. Mr. Jackman used in 4-grain doses every 2 hours with success in a case of tetanus, after chloral, (in 20-grain doses every 3 hours), had failed to do more than relieve pain. Dr. Sprimon found hypodermic injections painless even when 16 grains were introduced, and Dr. Savage administered in cases of insanity in doses of 5 grains subcutaneously." (Currie).

VALDIVINUM. Valdivin.

A principle obtained from the seeds of *Simaba valdivia*, very sparingly soluble in water (1 in 600 parts), soluble in alcohol (1 in 60 parts), less so in absolute alcohol (1 in 190 parts), dissolves readily in chloroform, but is insoluble in ether. It has very pronounced poisonous properties, but its effects are very slow in developing. M. Restrope, from whom we derive all our information, has noticed vomiting after a dose of $\frac{1}{17}$ of a grain, the largest dose that has ever been employed. Physiological researches are still incomplete, and the drug requires further investigation.

℞ Valdivin, 1 grain
Distilled water, 525 grains.

Dose, 15 minims (= $\frac{1}{35}$ grain). Causes slight puffiness sometimes at the point of puncture.

VASELINUM. Vaselin.

"M. Meunier considers that vaselin diffuses itself very rapidly through the body, its diffusibility

varying inversely with its consistence, and he states that antiseptics combined with it as a vehicle, give rise to no local pain or reaction when injected hypodermically; it is essential, however, that the vaselin should be absolutely pure. The best test for impurity is warm sulphuric acid, which does not blacken pure vaselin. *Eucalyptol* and *turpentine* have thus been injected, the former in phthisis, the latter in sciatica, according to the following formulæ:

℞ Pure eucalyptol, 5 parts;
Pure vaselin, 20 parts (*by weight*).

"Dose, from 15 minims to 3 drachms, to be injected daily into the outer part of the thigh.

℞ Berthelot's turpentine, 75 minims.
Pure vaselin, 5 drachms.

"Dose, from 15 minims to 2½ drachms daily.

"*Iodoform*, *phenol*, *iodine*, and *camphor*, may in this form be injected in the strength of one per cent.; *thymol* in half per cent.; and *menthol* in 10 per cent." (Currie).

VERATRIINUM—Veratriin.

Veratriin is insoluble in water, soluble in alcohol and ether. Doses of $\frac{1}{14}$ to $\frac{1}{4}$ of a grain suffice to produce decidedly toxic phenomena.

It is an antipyretic, and when administered by the mouth produces a sensation first of heat, then of burning, nausea, vomiting, colic, diarrhœa, tingling in the limbs; the respiratory movements become infrequent and painful; the pulse, which in the first place

is accelerated, becomes slow and irregular. The temperature falls, there is intense headache, involuntary muscular contractions, collapse and fainting with pupillary dilatation; salivation and emesis are the two most constant symptoms. Linon states that the exhibition of veratrum may be persisted in, despite the vomiting, in cases in which the antipyretic effect has not been attained, as this is generally produced only after emesis. The fall in the pulse-rate always precedes the fall in temperature. Its action appears in from two to three hours after administration, and it does not accumulate in the system.

Veratriin, 1 grain,
Dilute alcohol, 72 minims,
Distilled water, up to 288 minims.

Three to ten minims are equal to $\frac{1}{72}$ to $\frac{1}{24}$ of a grain of veratriin. [CAUTION.—Veratriin from (*V. viride*) is not to be confounded with VERATRINE the alkaloid principle of cevadilla (*V. sabadilla* or *album*). The latter is a drastic irritant cathartic and used externally chiefly (though it has found favor as a cardiac sedative), and requires to be administered with extreme caution.—ED.].

Veratriin is chiefly indicated in pneumonia and neuralgia, rheumatoid pains, continued and symptomatic fever. Eulenburg observed abscess after the injection of an alcoholic solution, 1 part in 250; and afterwards he used the same strength of solution prepared with equal parts of water and alcohol; and

Messrs. Lorent, Erlenmeyer, Hiffelsheim, and Eulenburg were all obliged to abandon its use hypodermically owing to its local irritant effects.

M. Hopp dissolved the resinous extract in alcohol at 50° in the proportion of 5½ grains to 160 minims of alcohol, but this solution produced a phlegmonous abscess at the point of puncture. He also purposed trying a solution of the resinous extract in glycerin, in the hope it would be less irritating.

[*Normal liquid veratrum* (from *veratrum viride*) Parke Davis, & Co's., may be safely employed hypodermically in doses of ½ to 1 minim, duly diluted; these doses may be slowly but cautiously increased. —Ed.]

ZINC SALTS.

M. Luton used a 1 in 50 solution of Chloride of Zinc in various forms of neuralgia and sciatica. [It is not to be trusted hypodermically, however, and is apt to produce serious ulceration and sloughing.—Ed.]

Sulphate of Zinc has been administered hypodermically in dilute solution in the treatment of obstinate dyspepsia by M. Wyschinski, [but is not fitted for such use.—Ed.]

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2 Apomorphine muriate, 1-10 grain.
3 Atropine sulphate, 1-50 grain.
4 Atropine sulphate, 1-100 grain.
5 Cocaine hydrochlorate, 1-4 grain.
6 Coniine hydrobromate, 1-8 grain.
7 Colchicine, 1-30 grain.
8 Corrosive sublimate and Urea, 1-25 grain.
9 Digitalin (soluble), 1-100 grain.
10 Gelsemine muriate, 1-50 grain.
11 Hyoscine hydrobrom., 1-100 grain.
12 Hyoscyamine, 1-50 grain.
26 Morphine sulphate, 1-2 grain.
27 Morphine sulphate, 1-3 grain.
13 Morphine sulphate, 1-4 grain.
25 Morphine sulphate, 1-6 grain.
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15 Morphine and Atropine, No. 1.
Morphine sulphate, 1-8 grain.
Atropine sulphate, 1-200 grain.
28 Morphine and Atropine, No. 4.
Morphine sulphate, 1-8 grain.
Atropine sulphate, 1-100 grain.
29 Morphine and Atropine, No. 5.
Morphine sulphate, 1-4 grain.
Atropine sulphate, 1-100 grain.
16 Morphine and Atropine, No. 2.
Morphine sulphate, 1-4 grain.
Atropine sulphate, 1-150 grain.
24 Morphine and Atropine, No. 2.
Morphine sulphate, 1-6 grain.
Atropine sulphate, 1-180 grain.
31 Nitroglycerin, 1-100 grain.
17 Picrotoxin, 1-50 grain.
18 Pilocarpine hydrochlor., 1-3 grain.
19 Pilocarpine nitrate, 1-3 grain.
20 Physostigmine sulph., 1-100 grain.
30 Quinine and Urea muriate.
(Quinine = ½ gr. of sulphate.)
21 Sodium arseniate, 1-10 grain.
22 Strychnine sulphate, 1-50 grain.
23 Strychnine sulphate, 1-100 grain.

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