**Dental medicine : a manual of dental materia medica and therapeutics, for practitioners and students / by Ferdinand J.S. Gorgas.**

John S. Hart.

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# DENTAL MEDICINE.

F. J. S. GORGAS M. D.

# DENTAL MEDICINE;

## A MANUAL

OF

# DENTAL MATERIA MEDICA

## AND THERAPEUTICS,

FOR

## PRACTITIONERS AND STUDENTS.

BY

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# PREFACE.

This work has been prepared by the author in deference to many requests from former pupils, and has been compiled from lectures delivered by him in dental institutions during the past twenty-five years, and notes obtained from the standard works on Materia Medica and Therapeutics, and also from personal experience as a dental practitioner and teacher.

While the author claims the credit of the compilation, he does not claim originality in the sources, derivations, medical properties and action of the various articles of dental materia medica which are given in this work.

His intention has been to present not alone his own ideas as to the particular application of remedies, but also those of well known and acknowledged authorities, and in such a manner as may be of service to the dental student in acquiring a knowledge of this important branch of his profession; hence nothing has been presented in this work that, in the author's opinion, is not applicable to dental practice, and that will not be of benefit to the dental student.

The dental formulary comprises many valuable combinations, and credit has been given, in every case where it was possible, to the authors of the different preparations.

The necessity for an American work of this kind has long been apparent, and after years of delay and promises the author gratefully dedicates this work to his former pupils in the dental institutions with which he has been and is now connected, in the capacity of a teacher.

HAMILTON TERRACE, BALTIMORE,

*January, 1884.*

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# DENTAL MEDICINE.

## INTRODUCTION.

### DEFINITION OF SUBJECTS.

*Materia Medica* is that branch of medical science which refers to and describes the substances known as "medicinal agents," which are employed in the prevention and treatment of disease.

*Therapeutics* is that branch of medical science which comprises the doctrine of the management of disease. Generally, however, the term is restricted to a description of the *modus operandi* of medicines, or, in other words, their use and effects when applied in the treatment of various morbid conditions. An accurate knowledge of the principles and rules which govern the administration and action of medicinal substances enables the practitioner to restore disordered functions, and to so impress the organism as to maintain harmonious conditions, by means of which the various functions, in a state of health, are intimately connected by relation and sympathy.

Some medicinal agents exert their influence on primary nourishment, converting food, by digestion, into the substance of organic beings, while other remedies, without interfering with digestion, by a modification of the process of assimilation, exert a destructive influence upon the tissues. Some medicinal agents affect the nervous system, and others are so irritant in their effects as to cause their speedy expulsion; while

others, again, have a particular affinity for certain organs, and are eliminated by them, the effects ceasing as soon as the evacuation is completed.

What are known as topical or external remedies act directly upon the parts to which they are applied, and their general effects are produced through the nervous system.

## GENERAL REMARKS.

In every case, the first object should be to ascertain and, if possible, remove the cause of a disease. It should be remembered that medicinal substances are always more certain in their action when applied directly to the affected tissue; also, that chemical, physical and vital changes result from the topical action of such substances; and that *age* modifies the effects, and also determines the dose; also *sex*, owing to the greater susceptibility of the nervous system in females than in males; also the *temperament*, as the sanguine, for example, is more susceptible to the influence of medicinal agents than the phlegmatic; also *habit and mode of life*, as the habitual use of such agents as stimulants lessens their influence, and the *occupation* affects the susceptibility to external influence; also *the condition of the body*, as different diseases exercise considerable influence on the effects of medicinal substances; also *the mind*, as a hopeful mind conduces to the beneficial action of medicines; also *idiosyncrasy*, as some individuals are more susceptible to the action or effects of medicinal substances than others; also the *nature of the tissue or organ* to which application is made, as some are more susceptible to the effect of medicinal agents than others, owing to rapidity of absorption and the degree of decomposition of the substance employed; also *climate*, from the recognized influence of climate in modifying the structure and functions of the animal economy, and in increasing or diminishing morbid conditions, and by such means influencing the effects of medicinal agents.

In most acute diseases there is a tendency to recovery after a certain time has elapsed, in case there is no failure in the

functions of any of the essential organs; hence, in all acute diseases, the state of the nervous system should be carefully watched.

In acute inflammations a dilatation of the smaller arteries of the structure is first observed, and an increased rapidity of the current of the blood through them. The capillaries and smaller veins soon become filled with blood cells, and the rapidity of the stream gradually lessens until stagnation occurs. The white corpuscles escape in large numbers through the walls of the capillaries, and distend the surrounding structures. In many cases, where the cause ceases to act, the parts gradually resume their normal condition. But when the cause continues to act as a local irritant, the vascular and nervous systems become excited. The contractions of the heart increase in rapidity and force, the temperature of the body is augmented, and other symptoms of the nervous centres make their appearance.

When the affection is not of a serious character, such symptoms as are especially troublesome may be relieved; but when the nervous and vascular systems are affected, both locally and generally, then it is necessary that the proper measures for their relief be promptly taken.

Where mucous membrane is the seat of the affection, it is often possible to remove the exciting cause. There are also many inflammatory affections met with, where, from the beginning, there is a diminished action of the heart, and a depressed state of the nervous centres. In the treatment of such cases, the depressed condition of the general system chiefly requires attention, as the progress and termination of the local affection depend upon the cause from which it has originated.

There are also morbid states not necessarily dependent on organic disease. Various acids are produced by the fermentation of substances containing starch or sugar, and there is reason for believing that an increased secretion of acid may take place from the mucous membrane of the stomach and produce symptoms of acidity independently of fermentation,

although one of the properties of the gastric fluid is to prevent fermentation. The symptoms of acidity are a sour taste, and the occurrence of acid eructations, often accompanied with heartburn, and sometimes with diarrhœa, and a feeling of sinking at the epigastrium.

In these cases the cause must be sought for, and such treatment instituted as will neutralize the acidity and stimulate the peptic glands to an increased secretion of the digestive fluid; also such as will regulate the bowels. Due attention must also be given to the diet, which should consist of such substances as will not readily ferment, and all food containing starch should be avoided.

Although topical remedies are more generally employed in the treatment of dental affections, yet there are many diseases of the oral cavity which are due to remote causes, and require constitutional as well as local treatment.

The appearances presented by the mucous membrane of the mouth are valuable, as indicating the state of other parts more remote; and it is frequently the case that, when the constitutional affection is overcome, the local symptoms disappear as a consequence, or become very amenable to local remedies.

## IMPORTANT POINTS IN DIAGNOSING AFFECTIONS OF THE MOUTH.

*The Irritation of Teething* is indicated by a hot, swollen and tender condition of the gums, fretfulness, irritable temper, refusal of nourishment, fever and thirst, and, if not relieved, diarrhœa with offensive motions, sometimes a troublesome cough, convulsions, and other serious results.

*An Abnormal Dentition* is indicated by a hot, dry mouth, swollen gums, tense, tender and shining, fever, disordered bowels, fretfulness, eruption on skin, diarrhœa, convulsions.

*Convulsions of Dentition* are indicated by such premonitory symptoms as irritable temper, unusual brightness of eyes, indisposition to eat or sleep, slight involuntary movements of muscles of face or extremities, grinding of teeth. The paroxysm is indicated by rigidity of body, utterances of a cry,

face turning red or purple, veins of neck turgid, suspension of respiration, loss of consciousness, irregular and intermittent contraction of muscles, protrusion of tongue, frothing at lips, distortion of face, rolling of eyeballs, contracted and rapid pulse.

*Inflammation of the Dental Periosteum* is indicated by a sense of uneasiness and fullness, which is at first relieved by pressure, but after active inflammation is established, pressure on the affected tooth causes intense pain. The tooth is also protruded, to a slight degree, from the alveolus, and also somewhat loosened, owing to the thickening of the investing membrane; and the inflammation, which is at first manifested by a red line near the margin of the gum, becomes general over the entire root, sometimes involving the neighboring gum, and even the palate and cheek, with pain of a constant character, and symptoms of febrile disturbance. A modification of the symptoms just enumerated, the tooth being tender to pressure, more or less raised in its cavity, and surrounded by a reddened and swollen gum, with a varying amount of pain, and the discharge of pus from around the neck, or from a fistulous opening in the gum, and such symptoms continuing for a long time, indicate the chronic form of an advanced stage of dental periostitis.

*Alveolar Abscess* is first indicated by pain of a constant character, which is afterwards aggravated at each pulsation; then swelling about the root of the affected tooth, which at length becomes defined and prominent, and afterwards points and discharges pus, when the active symptoms subside. The development of alveolar abscess is indicated by such constitutional symptoms as foul tongue, offensive breath, hot skin, thirst and headache, and, when the suppuration is considerable, symptomatic fever and rigors.

The characteristic pain of an alveolar abscess is deep-seated and throbbing, and, with the swelling, denotes the formation of pus. *A chronic form of alveolar abscess* is indicated by a subsidence of the active symptoms, and a continuance of the discharge of small quantities of pus through a fistulous open-

ing opposite the root of the affected tooth, or about its neck. An elastic fluctuating swelling in any part of the face, or for some distance down the neck, may result from abscessed teeth.

*Alveolar Abscess about to point Externally* is indicated by the skin, for some distance around a central point, becoming red and distended, with a throbbing sensation, succeeded by a change in the appearance of the skin to a thin and scaly surface, from which the epidermis scales off. The integument becomes glued down to the bone around the spot where the pus will ultimately appear; the latter following a fistulous track between the diseased tooth and the surface of the cheek, the fistula remaining open and discharging as long as the inflammatory action continues.

*Abscess of the Antrum* is indicated by a discharge of pus into the nose, sometimes producing scarcely any discomfort; at other times the severest local and constitutional suffering; an aching pain in the cheek, which is hot, flushed and somewhat swollen; and as the symptoms increase, greater pain, of a throbbing character, with the rigors and fever peculiar to suppuration; an expansion of the bone of the upper jaw; an elevation of the malar bone, with a very apparent depression beneath it; the molar teeth on the affected side depressed so as to appear elongated and to prevent the proper closure of the mouth; an increase of pus; the palate losing its concavity and becoming convex; the nostril of the affected side being encroached upon, and, in protracted cases, the floor of the orbit of the eye so pushed up as to force the eye partly from its socket; the sight affected by the stretching of the optic nerve; the walls of the antrum becoming so thin as to afford evidence of fluid fluctuation on pressure; at length the pus escaping through the cheek, or into the nose, or burrowing along the side of a root of a tooth and discharging into the mouth; the floor of the orbit giving way and the pus discharging along the lower eyelid.

*Necrosis of the Alveolar Process* is indicated by a dark purple and swollen condition of gum, with offensive purulent discharge.

*Fracture of the Alveolar Process* is indicated by a swollen, red and painful state of gum and tissues covering maxillary bone, occurring some days after the receipt of the injury, and, if neglected, may result in necrosis of the bone.

*Phosphor-Necrosis* is indicated by pain in jaw, similar to odontalgia, at first not constant, but soon becoming severe, and extending along side of the head, and to the shoulder, with swelling and great tenderness near the seat of the affection, the integument becoming red and tense, the teeth elongated and extremely painful when closed together, and also becoming loose; the gums and mucous membrane of the cheeks swollen and livid; at length, suppuration ensuing, with fever, rigors, etc.; gums becoming spongy, with escape of pus around necks of necrosed teeth, and the pus fetid, and the swelling very great, especially when the lower jaw is affected; a dense plastic exudation encasing the under and external surface of the bone; intense glistening redness of the skin, as the pus approaches the surface; at length, intense fever, with delirium and great suffering; the throwing out of a bony deposit of a peculiar appearance, like pumice-stone.

*Mercurial Poisoning, or Salivation*, when of a mild form, is indicated by a red margin of the gum, which eventually becomes somewhat spongy and tender, with a slight fetor of the breath and a metallic taste.

An increased degree of salivation, or *mercurial stomatitis*, is indicated by a profuse flow of saliva, intense fetor, strong metallic taste, tenderness of the gums, stiffness of the jaws, followed by ulceration and sloughing, if the injudicious use of the mercury is persisted in.

*Lead Poisoning* is indicated by a blue line upon the edge of the gums, and such constitutional symptoms as paralysis and colic attend severe cases.

*Scurvy* is indicated by a general spongy condition of the gums, and, in severe cases, intense fetor, ulceration and sloughing, together with constitutional symptoms of an aggravated character. Some varieties of salivary calculus will produce

similar local symptoms, especially when the general condition of the system is unfavorable.

*A Simple Form of Stomatitis* is indicated by slightly elevated, reddish, glistening patches, on the mucous membrane, which may coalesce, so that the whole surface is involved.

*Ulcerative Stomatitis* is indicated by ulceration commencing on or near the gums, more frequently in the lower than in the upper jaw, and usually on one side only, and spreading over the entire mouth. The gum first becomes thickened and congested, and of a deep purple color, and bleeds readily; ulceration speedily occurs, and exposes the necks of the teeth, and extends to the mucous membrane of the mouth generally, the ulcerated surface being covered with a dirty white or yellow exudation, leaving exposed numerous bright red points on a yellowish ground. The edges of the ulcers are sharp and ragged, and the ulcer, at first superficial, becomes gradually deeper. Ulcers of the mouth are often due to syphilis and dyspepsia, and are aggravated by the irritation resulting from the irregular edges of fractured and decayed teeth. When neglected, such ulcers may assume the appearance of epithelioma, especially when induration of the glands beneath the jaw is present.

*Ulcers of the Mouth due to Syphilis* are indicated when such ulceration is obstinate under any but specific treatment, and when accompanied by symptoms peculiar to syphilis.

*Syphilitic Inflammation of the Mucous Membrane of the Mouth* is indicated by a general swelling of the gums, with everted and ulcerated margins, exposing the necks of the teeth, although not affecting, to any great degree, their stability, with a viscid discharge, mixed with blood, from about their necks; soreness, rendering mastication painful; the affection slowly spreading, until the bone is exposed, and a portion exfoliated; greater degree of congestion; formation of mucous patches on sides of cheeks; superficial ulcers on inside of cheeks and beneath the tongue; erosions of the soft palate and tonsils; fissures at corner of the mouth, and eruptions on skin and scalp.

*Gangrenous Stomatitis* is indicated by a thick swelling of the face; skin tense and shining; swelling becoming hard and circumscribed, but devoid of tenderness, with a central spot, red and variegated in appearance; the formation of an ulcer, corresponding to the red spot outside, on the inside of the cheek; profuse salivation, the ulcerated part becoming gangrenous, with an opening through the cheek; absence of pain and destruction of parts.

*A Tumor of the Upper Jaw* is indicated by a gradually increasing prominence of the cheek, which more or less involves the mouth, obstructing the nostril, causing double vision by displacing the eyeball.

*A Malignant Form of Tumor of the Jaws* is indicated by a solid prominence, rapid in growth, and having a tendency to invade surrounding structures, and to fungate like a mushroom.

*A Dentigerous Cyst* is indicated by the expansion of the bone of the jaw at some particular spot, with disfigurement of the adjacent parts; a sense of weight and tension in the affected part; in some cases, constitutional irritation from pressure; pressure producing a parchment-like crackle or crepitation; absence of a tooth which has never been erupted nor extracted.

*An Unerupted Impacted Tooth* is indicated by a hard, bony tumor on the alveolar ridge, sometimes extending along the surface of the palate bone or the body of the maxilla, and in form corresponding to a tooth, the absence of which is noted.

*Necrosis of the Jaw* is indicated by inflammation like that of dental periostitis in the early stage, but differing as the disease progresses; gum over affected part thickened, tumid and of a red color; pus oozing from the edge of gum, which soon separates from the alveolus, the margins of which become exposed; loosening and loss of the teeth; the detachment of the dead alveoli from the living bone, and remaining loose in the substance of the thickened gum, surrounded by pus; the escape of the pus into the mouth, or pointing below the chin, or beneath the fascia of the neck, as low at times as the clavicle.

*Dislocation of the Lower Jaw*, when double, is indicated by inability to close the mouth; the mouth widely open; the chin

prominent, with a distinct hollow in front of each ear. A single dislocation is indicated by the mouth being only partially open, the chin displaced to one side, the distinct hollow below the ear being on the opposite side.

*Fracture of the Lower Jaw* is indicated by inability to close the mouth, and to speak articulately; laceration of the gums and hemorrhage; irregularity of the teeth from displacement of the fragments of bone; crepitation. Fracture of the maxilla may, however, show no displacement, or the fracture extending through the angle or ramus may be diagnosed by grasping the two sides of the jaw and moving them forcibly. Crepitus, increased flow of saliva, mobility of fragments, and irregularity of the teeth, if the fracture is through the body of the bone, are all signs of fracture. A swollen, red and painful condition of the tissues covering the lower jaw, occurring some days after the accident, denote the possibility of fracture, neglect causing a high degree of inflammation, and in some cases even necrosis of the bone.

*Cleft Palate* is indicated by a fissure extending through the soft palate alone, or through both soft and hard palates, and which may be combined with single or double hare-lip, in which case the intermaxillary bones are frequently displaced.

*Hare-Lip* is indicated by a congenital fissure of the upper lip, and may be single or double, and may also be combined with fissure of the hard and soft palates.

*Facial Paralysis* is indicated by distortion of the face, in which the mouth is drawn to one side, being due to paralysis of the facial nerve. The eye may also remain permanently open on the affected side, the saliva escape from the corner of the mouth, and the food collect under the cheek, on account of the paralysis of the buccinator muscle.

*A Nasal Polypus* is indicated by more or less obstruction of one or both nostrils, with occasional watery discharge; a gray or yellowish mass, like jelly in consistence, can be detected by the finger, if it is passed behind the soft palate, hanging down into the pharynx, and which greatly increases in damp weather; the nose bulged out on one side by the growth within.

*Thrush* is indicated by small white spots, the size of a pin's head, upon the dorsal surface of the tongue, palate, velum, inside of cheek and lips, which increase in size and coalesce, with a tendency to form false membrane, the crusts falling off and reappearing; the mucous membrane beneath redder than natural.

*Aphthæ or Follicular Ulceration* is indicated by the mucous membrane becoming inflamed, and the formation of small, round, transparent vesicles on the frænum in the sulcus between the lips and gums and lower surface of tongue. On the bursting of the vesicles, small, spreading ulcers, with red and swollen margins, appear, which become coated with a layer of oïdium albicans.

*Epulis* is indicated by a growth on the gums, either small and pedunculated, or large and sessile.

*Epithelioma* is indicated by a ragged ulcer on the lower lip, commencing as a wart, the skin around being hard and infiltrated, with enlargement of the submaxillary lymphatic glands, which become tender, or even ulcerated.

*Hypertrophy of the Gums* is indicated by an increase of their substance to such a degree as to cause them to overhang and cover the greater portion of the crowns of the teeth; tendency to hemorrhage; gums dark and livid; fetor of breath; increased flow of saliva.

*Rigg's Disease, or Pyorrhœa Alveolaris,* is indicated at first by an uneasy sensation; then inflammation of margins of gums; recession of gums and absorption of alveolar processes; a tendency to hemorrhage; inflammation extending deeper into gums; small sulci filled with pus; looseness of the teeth and change of positions; disagreeable taste; fetor of breath; dark livid color of gums, with thick margins; in some cases the gums denuded of their epithelium, with a polished appearance; the teeth, at length, held in their cavities by a tough, ligamentous attachment, due to the change occurring in the periosteum.

*Irritation of the Dental Pulp* is indicated by an uneasy sensation, which develops into pain of a gnawing or boring character,

the affected tooth being sensitive to changes of temperature, painful in mastication, but exhibiting no symptoms of inflammation of the gum or periosteum.

*Acute Inflammation of the Dental Pulp* is indicated by acute pain in the affected tooth, which frequently extends to neighboring teeth and to the side of the face, but is more intense in the tooth itself; pain may subside after a few hours' duration, to return again on the slightest provocation, or on patient assuming a horizontal position; the pain may also assume a throbbing character.

*Chronic Inflammation of the Dental Pulp* is indicated by pain less severe than in the acute form, and of less duration; coming on at irregular intervals, and wandering, like neuralgic pains, and incited by changes of temperature, and the application of irritants.

*Ossification of the Dental Pulp* is indicated by pain of a neuralgic character, which commences in an uneasy feeling, and changes to what has been described as a gnawing sensation, similar to that which attends the knitting together of the fractured parts of a bone. It may be continuous, but not constantly severe, and frequently amounts to no more than an uneasy sensation; at other times it may be sharp and darting, affecting the side of the head, and all the branches of the superior maxillary division of the fifth pair of nerves. The affected tooth is free from soreness and discoloration.

*Abnormal Sensibility of Dentine* is indicated by pain resulting from irritation of dentinal structure, being of shorter duration and less acute in character than that from an inflamed dental pulp; the pain of sensitive dentine soon subsides on the removal of the irritating cause.

*Atrophy of the Teeth* is indicated by certain structural defects in the enamel, in the form of opaque spots or pits.

*Abrasion of the Teeth* is indicated by a loss of structure, due to friction, to such an extent at times as to destroy the entire crowns.

*Hypertrophy of the Alveolar Processes* is indicated by an osseous deposit, either at the apex of the alveolar cavity, in

which case the affected tooth is protruded from its cavity, or by a deposit of osseous matter on the wall of the alveolar cavity, in which case the tooth is forced to one side.

*Dental Exostosis* is indicated by an uneasy sensation in the affected tooth, followed by a gnawing pain, which in some cases assumes a severe neuralgic character, especially when the deposit of cementum on the root is of considerable size, in which case there is a prominence apparent on the side of the alveolar ridge.

*Odontomes* are indicated by irregular masses of dental tissues, which result from morbid conditions of the formative pulp, such as nodules of enamel and dentine, hypertrophy of cementum, etc., some being congenital, others induced.

*Syphilitic Teeth* are indicated by notches, generally crescentic, in the cutting edges of the incisors, and peg-like shaped cuspids; also, a dark color and soft consistence are characteristic of such teeth.

*Denuding of the Teeth* is indicated by the gradual destruction of the enamel of the labial surfaces of the incisors, canines, and sometimes of the bicuspids, generally in the form of a continuous horizontal groove, smooth and regular; in some cases it may extend over nearly the whole of the labial surface, the color of the enamel being rarely changed.

*Dental Caries* is indicated by a process of gradual softening and disintegration of the tooth tissues by deleterious agents, the progress being hastened, primarily, by certain structural defects in the enamel and dentine, and secondarily, by certain diseases of the mucous membrane, and some derangement of the general health. Incipient dental caries is indicated by an opaque, whitish or gray appearance of the enamel. A pale brown varying to a nearly black color indicates the existence and progress of dental caries in the tooth tissues; the deeper the color the slower the progress of the caries, and the paler the color the more rapid the progress.

## CHARACTERISTIC INDICATIONS OF THE TONGUE.

*A White Coated Tongue* indicates febrile disturbance.

*A Brown Moist Tongue* indicates digestive disorder and an overloaded stomach.

*A Brown Dry Tongue* indicates depressed vital power.

*A Red Moist Tongue* indicates feebleness, especially from exhaustive discharges.

*A Red Dry Tongue* indicates inflammatory fever or pyrexia.

*A Red Glazed Tongue* indicates debility and inability to digest food and stimulants.

*A Tremulous, Moist and Flabby Tongue* indicates feebleness and nervousness.

*A Glazed Bluish Tongue*, with loss of epithelium in patches, and, in severe cases, cracks and scars, indicates tertiary syphilis.

## ABBREVIATIONS.

In medical prescriptions, letters, parts of words, or certain symbols, are employed as abbreviations, to designate the substance, quantity, etc., as follows :—

| ABBREVIATION. | LATIN WORD. | ENGLISH WORD. |
|---|---|---|
| āā, | Ana (G.), | Of each. |
| Ad saturand., | Ad saturandum, | Until saturated. |
| Ad lib., | Ad libitum, | At pleasure. |
| Aq., | Aqua, | Water. |
| Aq. tepid, | Aqua tepida, | Warm water. |
| Aq. ferv., | Aqua fervens, | Hot water. |
| Aq. dest., | Aqua destillata, | Distilled water. |
| C. or Cong., | Congius, | A gallon. |
| Chart., | Chartula, | A small paper. |
| Coch., | Cochlear, | A spoonful. |
| Coch. mag., | Cochlear magnum, | A tablespoonful. |
| Coch. parv., | Cochlear parvum, | A teaspoonful. |
| Colent., | Colentur, | Let them be strained. |
| Collyr., | Collyrium, | An eye-water. |
| Comp., | Compositus, | Compound. |
| Contus., | Contusus, | Bruised or broken. |
| Cort., | Cortex, | Bark. |
| Ext., | Extractum, | An extract. |

| ABBREVIATION. | LATIN WORD. | ENGLISH WORD. |
|---|---|---|
| F. or Ft., | Fiat vel fiant, | Let there be made. |
| Fol., | Folium vel folia, | A leaf or leaves. |
| Garg., | Gargarysma, | A gargle. |
| Gr., | Granum vel grana, | A grain or grains. |
| Gtt., | Gutta vel guttæ, | A drop or drops. |
| Haust., | Haustus, | A draught. |
| Infus., | Infusum, | An infusion. |
| M., | Misce, | Mix. |
| Mass., | Massa, | A mass. |
| Mist., | Mistura, | A mixture. |
| O., | Octarius, | A pint. |
| Pil., | Pilula vel pilulæ, | A pill or pills. |
| Pulv., | Pulvis vel pulveres, | A powder or powders. |
| q. s., | Quantum sufficit, | A sufficient quantity. |
| ℞, | Recipe, | Take. |
| Rad., | Radix, | A root. |
| S., | Signa, | Write or give directions. |
| Spts., | Spiritus, | Spirits. |
| ss., | Semis, | The half. |
| Syr., | Syrupus, | Syrup. |
| Tinct., | Tinctura, | A tincture. |
| ℔, | Libra, | A pound. |
| ℥, | Uncia, | An ounce. |
| ʒ, | Drachma, | A drachm. |
| ℈, | Scrupulus, | A scruple. |
| f℥, | Fluiduncia, | A fluid ounce. |
| fʒ, | Fluidrachma, | A fluid drachm. |
| ♏, | Minim, | A drop. |

Although the symbol (♏) is adopted in the United States Pharmacopœia to designate a drop, it should be remembered that the size of a drop varies according to the greater or less fluidity and gravity of the liquid, and the shape of the mouth of the bottle from which it is dropped. It is best to use a small vial with a thin edge of mouth, when great precision is necessary, and to dilute the active medicine and administer it in the form of a mixture; for in some preparations, one hundred and fifty drops would measure but a fluidrachm, while in others the same number of drops would be somewhat more than three fluidrachms.

*A tablespoonful* of any liquid is regarded as equal to *half an*

*ounce* by measure; and a *teaspoonful* equal to a *fluidrachm;* and such measures are sufficiently accurate where no great precision is requisite.

A gallon contains eight pints.

A pint contains sixteen fluidounces.

A fluidounce contains eight fluidrachms.

A fluidrachm contains sixty minims (♏).

A wine glass (approximate measurement) contains two fluidounces.

A teacup (approximate measurement) contains four fluidounces.

A tablespoon of powder (approximate measurement) contains two drachms.

A teaspoon of powder (approximate measurement) contains one-half drachm.

One drop of water (small drop, approximate measurement) contains one minim.

One drop of essential oils (approximate measurement) contains one-half minim.

A graduated measure glass is the most accurate measure, as spoons, glasses, etc., vary greatly in size.

## FINENESS OF POWDER.

The fineness of powder is denoted either by descriptive words (as in the case of brittle or easily pulverizable substances), or in terms expressing the number of meshes to a linear inch in the sieve. The following degrees of fineness will prove serviceable in the preparation of dentifrices, polishing powders, etc.:—

A *very fine* powder . . { Should pass through a sieve having 80 or more meshes to linear inch. } = No. 80 Powder.

A *fine* powder . . . { Should pass through a sieve having 60 meshes to the linear inch. } = No. 60 Powder.

A *moderately fine* powder { Should pass through a sieve having 50 meshes to the linear inch. } = No. 50 Powder.

A *moderately coarse* powder { Should pass through a sieve having 40 meshes to the linear inch. } = No. 40 Powder.

A *coarse* powder . . . { Should pass through a sieve having 20 meshes to the linear inch. } = No. 20 Powder.

# WEIGHTS AND MEASURES.

## APOTHECARIES' WEIGHT.

| | | |
|---|---|---|
| 20 grains (gr.) | make 1 scruple | sc. or ℈ |
| 3 scruples | make 1 drachm | dr. or ʒ |
| 8 drachms | make 1 ounce | oz. or ℥ |
| 12 ounces | make 1 pound | lb. or ℔ |

SCALE OF COMPARISON.

| lb. | | oz. | | dr. | | sc. | | gr. |
|---|---|---|---|---|---|---|---|---|
| 1 | = | 12 | = | 96 | = | 288 | = | 5760 |
| | | 1 | = | 8 | = | 24 | = | 480 |
| | | | | 1 | = | 3 | = | 60 |
| | | | | | | 1 | = | 20 |

## TROY WEIGHT.

| | | |
|---|---|---|
| 24 grains (gr.) | make 1 pennyweight | dwt. |
| 20 pennyweights | make 1 ounce | oz. |
| 12 ounces | make 1 pound | lb. |
| 3½ grains | make 1 carat (diamond weight) | k. |

SCALE OF COMPARISON.

| lb. | | oz. | | dwt. | | gr. |
|---|---|---|---|---|---|---|
| 1 | = | 12 | = | 240 | = | 5760 |
| | | 1 | = | 20 | = | 480 |
| | | | | 1 | = | 24 |
| | | | | 1 k. | = | 3½ |

## AVOIRDUPOIS WEIGHT.

| | | |
|---|---|---|
| 16 drachms (dr.) | make 1 ounce | oz. |
| 16 ounces | make 1 pound | lb. |
| 25 pounds | make 1 quarter | qr. |
| 4 quarters | make 1 hundredweight | cwt. |
| 20 hundredweight | make 1 ton | T. |
| 100 pounds | make 1 cental | C. |

SCALE OF COMPARISON.

| T. | | cwt. | | qr. | | lb. | | oz. | | dr. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | = | 20 | = | 80 | = | 2000 | = | 32000 | = | 512000 |
| | | 1 | = | 4 | = | 100 | = | 4000 | = | 25600 |
| | | | | 1 | = | 25 | = | 400 | = | 6400 |
| | | | | | | 1 | = | 16 | = | 256 |
| | | | | | | | | 1 | = | 16 |

## THE METRIC OR FRENCH DECIMAL SYSTEM OF WEIGHTS AND MEASURES.

The metric system is based upon the METER, which is the standard unit of *length* of that system, and equal to 39.370432 inches, or about 10 per cent. longer than the yard.

The metric unit of *fluid measure* is the LITER—the cube of $\frac{1}{10}$ meter, or 1000 cubic-centimeters—equal to about 34 fluid ounces.

The metric unit of *weight* is the GRAM, which represents the weight of one cubic-centimeter of water at its maximum density. It is equal to 15(.43234874) troy grains.

One CUBIC-CENTIMETER is equal to 16.231 minims.

IN WRITING PRESCRIPTIONS IT IS SUFFICIENTLY ACCURATE AND SAFE TO CONSIDER 1 GRAM AS EXACTLY EQUAL TO 15 TROY GRAINS, AND TO CONSIDER 1 CUBIC-CENTIMETER AS EQUAL TO 15 MINIMS.

We accordingly have:—

1 gram equal to $\frac{15}{1}$ troy grains.
1 troy grain equal to $\frac{1}{15}$ gram.
1 cubic-centimeter equal to $\frac{1}{4}$ fluid drachm.
1 fluid drachm equal to $\frac{4}{1}$ cubic-centimeter.

Hence—

1. TO CONVERT TROY GRAINS INTO GRAMS, OR MINIMS INTO CUBIC-CENTIMETERS—

a. *Divide by 10, and from the quotient subtract one-third;* or,
b. *Divide by 15;* and

2. TO CONVERT APOTHECARIES' DRACHMS INTO GRAMS, OR FLUIDRACHMS INTO CUBIC-CENTIMETERS, *multiply by 4.*

In writing prescriptions the "gram" (abbreviated "Gm.") and "cubic-centimeter," (abbreviated "C.C.," which may be called "fluigram," and written "f Gm") only, should be used.

The centigram, which is a very convenient unit to refer to in medicine and pharmacy, is used in books and in speaking, but not in writing prescriptions.

All other terms, and units, and prefixes, used in the metric system, may be wholly ignored by the physician and the pharmacist.*

* The prefixes are simply numerals, as follows:—

| | | | |
|---|---|---|---|
| *myria*, | which means 10,000. | *deci*, | which means 0.1. |
| *kilo*, | " " 1,000. | *centi*, | " " 0.01. |
| *hecto*, | " " 100. | *milli*, | " " 0.001. |
| *deka*, | " " 10. | | |

and are quite unnecessary in the writing of prescriptions (if not in all cases), English numerals being more convenient, and at least equally explicit.

EXAMPLE OF A METRIC PRESCRIPTION.

℞. Hydrarg. chloridi. corros..... 0|25 Gm.
Potassii iodidi..... 10|00 Gm.
Aquæ..... 100|00 C. C.
Tinct. cinch. comp..... 100|00 C. C.
Mix.

The use of a decimal line prevents possible errors.

To write a prescription for fifteen doses of any medicine, write it first for *one* dose in *grains* and *minims*, and then substitute the same number of "grams" and "cube-cents," thus:—

℞. Opii.....gr. j
Camphoræ.....gr. ij.
Make one pill.

and to get fifteen such doses in metric terms, write—

℞. Opii.....1 Gm.
Camphoræ.....2 Gm.
Make fifteen pills.

The gram and the cubic-centimeter (*fluigram*), when referring to liquids, may be considered as equal quantities, except the liquids be very heavy (as in the case of chloroform), or very light (as in the case of ether).

Measures may be discarded and weights exclusively employed, if preferred. All quantities in a prescription would then be expressed in GRAMS.*

The average "DROP" (water) may be considered equal to 0.05 *C. C.*, or 0.05 *Gm.* An average TEASPOON holds 5 *C. C.*, and an average TABLESPOON 20 *C. C.* Decimal numbers should be used as far as practicable without sacrifice of accuracy as to strength and dose of the preparation. It is safe to prescribe 30 *Gm.* for one troy ounce, and 250 *C. C.* for eight fluid-ounces.

* As any liquid medicine must necessarily be administered to the patient in *measured*, and not in *weighed*, doses, it will, of course, be more convenient to the physician to continue to make use of fluid measures in writing prescriptions, especially as he is already accustomed to this, and would not then have to bear in mind the specific gravity of *any* liquid ingredient in the prescription. To the pharmacist it makes but little difference, as he will have both weights and measures, and can use one or the other, as may be directed. If the physician discards measures, he must, of necessity, so adjust the proportion in his formula as to produce a mixture of which, after all, the dose must be a "teaspoonful," or some other convenient measure, and this is as unnecessary as it is difficult.—*Oscar Oldberg, Phar. D., in Blakiston's Phys. Visiting List.*

The above contains ALL THAT IT IS NECESSARY TO KNOW OR LEARN of the metric system, IN ORDER TO WRITE METRIC PRESCRIPTIONS, without a metric posological table, or with one.

To become familiar with the system, the rules given above for the conversion of apothecaries' weights and measures into the corresponding metric quantities, may be profitably used, the results to be verified by comparison with the following

TABLE OF EQUIVALENTS.

| APOTHECARIES' WEIGHTS (AND MEASURES). | METRIC WEIGHTS (AND MEASURES). | |
|---|---|---|
| *Troy grains (or minims).* | *Grams (or cubic-centimeters).* | |
| $\frac{1}{64}$ | 0.001 | $(\frac{1}{1000})$ |
| $\frac{1}{32}$ | 0.002 | $(\frac{2}{1000})$ |
| $\frac{1}{16}$ | 0.004 | $(\frac{4}{1000})$ |
| $\frac{1}{8}$ | 0.008 | $(\frac{8}{1000})$ |
| $\frac{1}{4}$ | 0.016 | $(\frac{1}{60})$ |
| $\frac{1}{2}$ | 0.033 | $(\frac{1}{30})$ |
| 1 | 0.066 | $(\frac{1}{15})$ |
| 2 | 0.133 | $(\frac{2}{15})$ |
| 5 | 0.333 | $(\frac{1}{3})$ |
| 10 | 0.666 | $(\frac{2}{3})$ |
| 15 | 1.000 | (1) |
| 20 | 1.333 | $(1\frac{1}{3})$ |
| 30 | 2.000 | (2) |
| *Drachms (or fluidrachms).* | *Grams (or cubic-centimeters).* | |
| 1 | 4 | |
| 2 | 8 | |
| 4 | 16 | |
| 6 | 24 | |
| *Troy ounces (or fluidounces).* | | |
| 1 | 32 | |
| 2 | 64 | |
| 4 | 128 | |
| 6 | 192 | |
| 8 | 256 | |
| 12 | 384 | |
| 16 | 512 | |

The adoption of the metric system of weights and measures is a matter of time only. Its advantages over other systems are well recognized.

## RULES FOR REGULATING DOSES.

The *doses* given in this work are applicable to adult age, unless the contrary is specified; and for the convenience of students, the rules of Gaubins and Young for determining the proper doses of medicines for children are furnished below.

Take the dose for an adult as unity, and for other ages as follows:—

The dose for a person of middle age being 1, or 1 drachm,—

| | | | | | |
|---|---|---|---|---|---|
| That for a person | from | 14 to 21 | years | will be | ⅔, or 2 scruples. |
| " " | | 7 to 14 | " | " | ½, or ½ a drachm. |
| " " | | 4 to 7 | " | " | ⅓, or 1 scruple. |
| " a child of | | 4 | " | " | ¼, or 15 grains. |
| " " | | 3 | " | " | ⅙, or 10 grains. |
| " " | | 2 | " | " | ⅛, or 8 grains. |
| " " | | 1 year | | " | $\frac{1}{12}$, or 5 grains. |

The following simple rule by Dr. Young will be found to be convenient: "For children under twelve years, the doses of most medicines must be diminished in the proportion of the age to the age increased by 12; thus, at two years to $\frac{1}{7}$; viz: $\frac{2}{2+12}=\frac{1}{7}$. At twenty-one the full dose may be given." Hence,—

For one year, $\frac{1}{1+12}=\frac{1}{13}$

For two years, $\frac{2}{2+12}=\frac{1}{7}$

For three years, $\frac{3}{3+12}=\frac{1}{5}$

For four years, $\frac{4}{4+12}=\frac{1}{4}$

For six years, $\frac{6}{6+12}=\frac{1}{3}$

At twelve years the dose is one-half that of the adult. *The U. S. Dispensatory* states that "To the above rules some exceptions are offered, in particular medicines, which require to be given to children in much larger proportional doses than those above stated. Such are castor oil and calomel, a certain quantity of which will, in general, not produce a greater effect in a child two or three years old than double the quantity in

an adult." "Females usually require smaller doses than males, and persons of sanguine temperament than the phlegmatic." The influence of constitutional peculiarities, such as are known as idiosyncrasies, often exist and render patients more than usually susceptible, or the opposite, to the action of medicines, the doses of which must be regulated accordingly. It should also be remembered that the susceptibility to the action of medicines is diminished by frequent and continued use. In advancing age, the dose is gradually lessened.

Opiates affect children to a greater degree than adults, but children bear larger doses of calomel than adults. Females are more rapidly affected by purgatives than males, and the condition of the uterine system is very important.

Medicinal substances act differently on the same person in summer and in winter, and in different climates. Narcotics act more energetically in hot than in cold climates, and, as a consequence, smaller doses are required in hot climates; the opposite is the case with regard to calomel. Owing to a peculiarity of stomach, or rather disposition of body, unconnected with temperament, comparatively mild remedies operate very violently on some individuals.

When administering remedies, the intervals between the doses should be so regulated that the second dose may be taken before the effect produced by the first is entirely effaced. Some medicinal substances, such as mercurial salts, arsenic, etc., are prone to accumulate in the system; and dangerous symptoms may arise, if the doses rapidly succeed one another.

The action of some remedies, such as digitalis, elaterium, etc., may continue long after the discontinuance of the agent, and a too powerful effect occur, even by a repetition in diminished doses. Some remedies, such as castor oil, aloes, etc., acquire activity by continued use, hence the dose requires to be diminished.

# TABLE OF THE DOSES OF MEDICINES.

Arranged in Alphabetical Order, and Expressed in Terms of Both the Apothecaries' and the Decimal Metric System of Weights and Measures.

Revised and Corrected according to the New Pharmacopœial Standard (1883).

BY OSCAR OLDBERG, PH.D.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Abstract. aconiti | 3 to 10 centigrams. | ½ to 1½ grains. |
| Abstract. aspidospermæ | 0.30 to 1.20 grams | 5 to 20 grains. |
| Abstract. belladonnæ | 3 to 10 centigrams. | ½ to 1½ grains. |
| Abstract. cannab. ind. | 6 to 20 centigrams. | 1 to 3 grains. |
| Abstract. conii | 6 to 20 centigrams. | 1 to 3 grains. |
| Abstract. coto | 6 to 20 centigrams. | 1 to 3 grains. |
| Abstract. digitalis | 6 to 20 centigrams. | 1 to 3 grains. |
| Abstract. gelsemii | 6 to 20 centigrams. | 1 to 3 grains. |
| Abstract. hyoscyami | 12 to 40 centigrams. | 2 to 6 grains. |
| Abstract. ignatiæ | 6 to 20 centigrams. | 1 to 3 grains. |
| Abstract. ipecac | 0.20 to 2 grams. | 3 to 30 grains. |
| Abstract. jalapæ | 0.40 to 2 grams. | 6 to 30 grains. |
| Abstract. nuc. vom | 6 to 20 centigrams. | 1 to 3 grains. |
| Abstract. phytolaccæ | 0.30 to 1 gram | 5 to 15 grains. |
| Abstract. pilocarpi | 0.40 to 2 grams | 6 to 30 grains. |
| Abstract. podophylli | 25 to 60 centigrams. | 4 to 10 grains. |
| Abstract. sanguin. alterat. | 6 to 20 centigrams. | 1 to 3 grains. |
| Abstract. sanguin. emet. | 0.60 to 1.20 Gm | 10 to 15 grains. |
| Abstract. senegæ. | 25 to 60 centigrams. | 4 to 10 grains. |
| Abstract. valerianæ. | 0.60 to 1.20 Gm | 10 to 15 grains. |
| Abstract. veratr. vir. | 6 to 20 centigrams. | 1 to 3 grains. |
| Acet. lobeliæ | 1 to 4 C. c | 15 to 60 minims. |
| Acet. opii | 0.30 to 1 C. c. | 5 to 16 minims. |
| Acet. sanguinar | 1 to 2 C. c | 15 to 30 minims. |
| Acet. scillæ | 0.60 to 2 C. c. | 10 to 30 minims. |
| Acid. acet. dil. | 4 to 6 C. c | 60 to 90 minims. |
| Acid. arsenios | 1 to 5 milligrams | $\frac{1}{64}$ to $\frac{1}{12}$ grain. |
| Acid. benzoic | 0.30 to 1 Gm. | 5 to 15 grains. |
| Acid. boric | 30 to 60 centigrams. | 5 to 10 grains. |
| Acid. carbolic. | 6 to 20 centigrams. | 1 to 3 grains. |
| Acid. gallic | 0.20 to 1 Gm. | 3 to 15 grains. |
| Acid. gall. in albuminuria | 0.60 to 4 Gm. | 10 to 60 grains. |
| Acid. hydrobrom. 34% | 0.60 to 1 Gm. | 10 to 15 grains. |
| Acid. hydrobrom. dil | 1 to 2.50 C. c | 15 to 40 minims. |
| Acid. hydrochlor. | 20 to 60 centigrams. | 3 to 10 grains. |
| Acid. hydrochlor. dil | 0.60 to 2 C. c | 10 to 30 minims. |
| Acid. hydrocyan. dil | 0.10 to 0.30 C. c. | 2 to 6 minims. |
| Acid. lactic | 1 to 4 Gm | 15 to 60 grains. |
| Acid. nitr | 20 to 60 centigrams. | 3 to 10 grains. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Acid. nitr. dil | 0.60 to 2 C. c | 10 to 30 minims. |
| Acid. nitro-hydrochlor. | 20 to 60 centigrams. | 3 to 10 grains. |
| Acid. nitro-hydrochlor. dil. | 0.30 to 1.30 C. c | 5 to 20 minims. |
| Acid. phosphoric (50%) | 0.20 to 1 Gm | 3 to 15 grains. |
| Acid. phosphoric dil | 0.60 to 4 C. c | 10 to 60 minims. |
| Acid. salicyl | 0.30 to 1 Gm | 5 to 15 grains. |
| Acid. sulphuric | 0.30 to 0.60 Gm | 5 to 10 grains. |
| Acid. sulphuric dil | 0.30 to 2 C. c | 5 to 30 minims. |
| Acid. sulphuric arom | 0.30 to 2 C. c | 5 to 30 minims. |
| Acid. sulphuros | 2 to 4 C. c | 30 to 60 minims. |
| Acid. tannic | 10 to 60 centigrams. | 2 to 10 grains. |
| Aconitina (white crystals) | 0.15 to 0.30 miligr. | $\frac{1}{400}$ to $\frac{1}{200}$ grain. |
| Aloe | 10 to 30 centigrams. | 2 to 5 grains. |
| Aloinum | 6 to 20 centigrams. | 1 to 3 grains. |
| Alumen | 0.50 to 1 Gm | 10 to 15 grains. |
| Ammonii benzoas | 0.50 to 1.30 Gm | 10 to 20 grains. |
| Ammonii bromid | 0.30 to 2 Gm | 5 to 30 grains. |
| Ammonii carb | 20 to 60 centigrams. | 3 to 10 grains. |
| Ammonii chlorid | 1 to 2 Gm | 15 to 30 grains. |
| Ammonii iodid | 0.20 to 1 Gm | 3 to 15 grains. |
| Ammonii phosph | 30 to 1.30 Gm | 5 to 20 grains. |
| Ammonii picras | 0.50 to 3 centig'ms. | ¼ to ½ grain. |
| Ammonii sulph | 0.20 to 1 Gm | 3 to 15 grains. |
| Ammonii valer | 0.20 to 1 Gm | 3 to 15 grains. |
| Amyl nitris | 0.10 to 0.40 C. c | 2 to 5 minims. |
| Amylum iodatum | 0.20 to 2 Gm | 3 to 30 grains. |
| Ant. et pot. tartr.; diaph | 4 to 10 milligrams. | $\frac{1}{16}$ to $\frac{1}{6}$ grain. |
| Ant. et pot. tartr.; emetic. | 6 to 10 centigrams. | 1 to 2 grains. |
| Antimonii oxid | 3 to 10 centigrams. | 1½ to 2 grains. |
| Antimonii oxysulphuret | 3 to 10 centigrams. | ½ to 2 grains. |
| Antimonii sulphid | 3 to 10 centigrams. | ½ to 2 grains. |
| Antimonii sulphuret | 3 to 10 centigrams. | ½ to 2 grains. |
| Apomorph. hydrochlor. | 3 to 6 milligrams | $\frac{1}{30}$ to $\frac{1}{10}$ grain. |
| Aqua ammoniæ | 0.30 to 2 C. c. | 6 to 30 minims. |
| Aqua amygd. amor | 10 to 15 C. c | 2 to 4 fl. drachms. |
| Aqua camphoræ | 15 to 60 C. c | ½ to 2 fl. oz. |
| Aqua chlori. | 4 to 15 C. c | 1 to 4 fl. drachms. |
| Aqua creasoti | 4 to 15 C. c | 1 to 4 fl. drachms. |
| Aqua laurocerasi | 0.30 to 2 C. c | 6 to 30 minims. |
| Argenti iodidum | 3 to 10 centigrams. | ½ to 2 grains. |
| Argenti nitras | 1 to 2 centigrams | $\frac{1}{6}$ to $\frac{1}{3}$ grain. |
| Argenti oxid | 3 to 10 centigrams. | ½ to 2 grains. |
| Arsenii iodidum | 1 to 2.50 milligr'ms | $\frac{1}{64}$ to $\frac{1}{10}$ grain. |
| Asafœtida | 0.30 to 1.30 Gm | 5 to 20 grains. |
| Atropina | 0.50 to 2 milligrams | $\frac{1}{128}$ to $\frac{1}{32}$ grain. |
| Atropinæ sulph | 0.50 to 2 milligrams | $\frac{1}{128}$ to $\frac{1}{32}$ grain. |
| Auri et sodii chlorid | 2 to 4 milligrams | $\frac{1}{32}$ to $\frac{1}{16}$ grain. |
| Bebeerinæ sulph | 20 to 60 centigrams. | 3 to 10 grains. |
| Berberina and its salts | 0.20 to 1 Gm | 3 to 15 grains. |
| Bismuthi citras | 0.20 to 1 Gm | 3 to 15 grains. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Bismuthi et ammon. citr . | 0.10 to 1 Gm . . . | 1 to 15 grains. |
| Bismuthi subcarb . . . | 0.40 to 2 Gm . . . | 6 to 30 grains. |
| Bismuthi subnitr . . . . | 0.40 to 2 Gm . . . | 6 to 30 grains. |
| Bismuthi tannas . . . . | 0.40 to 2 Gm . . . | 6 to 30 grains. |
| Bismuthi valer . . . . | 6 to 20 centigrams. | 1 to 3 grains. |
| Brayera . . . . . | 8 to 15 Gm . . . | 2 to 6 drachms. |
| Bromum . . . . . | 3 to 10 centigrams. | ½ to 2 grains. |
| Brucina . . . . . | 1 to 4 milligrams . | $\frac{1}{64}$ to $\frac{1}{16}$ grain. |
| Caffeina . . . . . | 6 to 30 centigrams. | 1 to 5 grains. |
| Caffeinæ citras . . . . | 6 to 30 centigrams. | 1 to 5 grains. |
| Calcii bromidum . . . . | 0.30 to 2 Gm . . . | 5 to 30 grains. |
| Calcii carb . . . . . | 1 to 4 Gm . . . | 15 to 60 grains. |
| Calcii hypophosphis . . | 0.20 to 1 Gm . . . | 3 to 15 grains. |
| Calcii iodidum . . . . | 6 to 20 centigrams. | 1 to 3 grains. |
| Calcii phosphas . . . . | 1 to 2 Gm . . . | 15 to 30 grains. |
| Calx sulphurata . . . . | 2 to 6 centigrams. . | ⅓ to 1 grain. |
| Cambogium . . . . . | 6 to 25 centigrams. | 1 to 4 grains. |
| Camphora . . . . . | 20 to 60 centigrams. | 3 to 10 grains. |
| Camph. monobrom . . . | 10 to 30 centigrams. | 2 to 5 grains. |
| Cantharis . . . . . | 3 to 6 centigrams. | ½ to 2 grains. |
| Capsicum . . . . . | 6 to 20 centigrams. | 1 to 3 grains. |
| Castoreum . . . . . | 0.40 to 1 Gm . . . | 6 to 15 grains. |
| Catechu . . . . . | 1 to 2 Gm . . . | 15 to 30 grains. |
| Cerii nitras . . . . . | 6 to 20 centigrams. | 1 to 3 grains. |
| Cerii oxalas . . . . . | 6 to 20 centigrams. | 1 to 3 grains. |
| Chinoidinum . . . . . | 0.20 to 2 Gm . . . | 3 to 30 grains. |
| Chloral . . . . . | 0.20 to 1 Gm . . . | 3 to 15 grains. |
| Chloroformum . . . . | 0.05 to 0.30 C. c . | 1 to 5 minims. |
| Chrysarobinum . . . . | 0.20 to 1 Gm . . . | 3 to 15 grains. |
| Cinchona . . . . . | 1 to 4 Gm . . . | 15 to 60 grains. |
| Cinchonidina, and its salts | 0.06 to 2 Gm . . . | 1 to 30 grains. |
| Cinchonina, and its salts . | 0.06 to 2 Gm . . . | 1 to 30 grains. |
| Cinnamomum . . . . | 0.40 to 2 Gm . . . | 6 to 30 grains. |
| Codeina . . . . . | 3 to 10 centigrams. | ½ to 2 grains. |
| Confectio sennæ . . . . | 4 to 10 grams . . | 1 to 2 grains. |
| Coniina, and its salts . . | 1 to 2 milligrams . | $\frac{1}{64}$ to $\frac{1}{32}$ grain. |
| Copaiba . . . . . | 1 to 4 C. c . . . | 15 to 60 minims. |
| Cotoina . . . . . | 1 to 3 centigrams . | $\frac{1}{6}$ to $\frac{1}{2}$ grain. |
| Creasotum . . . . . | 0.05 to 0.20 C. c . | 1 to 3 minims. |
| Creta præpar . . . . . | 1 to 5 Gm . . . | 15 to 75 grains. |
| Croton chloral . . . . | 5 to 60 centigrams. | 1 to 10 grains. |
| Cubeba . . . . . | 1 to 4 Gm . . . | 15 to 60 grains. |
| Cupri acetas . . . . . | 3 to 40 centigrams. | ½ to 6 grains. |
| Cupri sulphas . . . . . | 3 to 60 centigrams. | ½ to 10 grains. |
| Cuprum ammon . . . . | 1 to 6 centigrams. | $\frac{1}{6}$ to 1 grain. |
| Curare . . . . . | 2 to 10 milligrams. | $\frac{1}{32}$ to $\frac{1}{6}$ grain. |
| Curarina . . . . . | 1 to 3 milligrams. | $\frac{1}{64}$ to $\frac{1}{20}$ grain. |
| Decoct. aloes comp . . . | 15 to 60 C. c . . . | ½ to 2 fl. ozs. |
| Decoct. sarsap. comp . . | 50 to 200 C. c . . | 2 to 6 fl. ozs. |
| Digitalinum . . . . . | 1 to 2 milligrams . | $\frac{1}{64}$ to $\frac{1}{32}$ grain. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Digitalis | 3 to 10 centigrams. | ½ to 2 grains. |
| Duboisina, and its salts | 0.50 to 1 milligram. | $\frac{1}{120}$ to $\frac{1}{60}$ grain. |
| Elaterinum; U. S. P., 1880 | 1 to 4 milligrams. | $\frac{1}{60}$ to $\frac{1}{15}$ grain. |
| Elaterium; U. S. P., 1870 | 4 to 30 milligrams. | $\frac{1}{15}$ to ½ grain. |
| Emetina, and salts, emetic | 8 to 15 milligrams. | ⅛ to ¼ grain, |
| Emetina, and salts., diaph | 0.50 to 2 milligrams. | $\frac{1}{120}$ to $\frac{1}{30}$ grain. |
| Emulsio hydrocyan | 2 to 4 C. c. | ½ to 1 fl. drachm. |
| Ergota | 1 to 4 Gm. | 15 to 60 grains. |
| Ergotinum | 10 to 50 centigrams. | 2 to 6 grains. |
| Eserina and its salts | 1 to 3 milligrams. | $\frac{1}{64}$ to $\frac{1}{20}$ grain. |
| Extr. absinthii | 10 to 60 centigrams. | 2 to 6 grains. |
| Extr. absinthii fluid | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. achilleæ | 20 to 60 centigrams. | 3 to 10 grains. |
| Extr. achilleæ fluid | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. aconiti fol. (Engl). | 2 to 6 centigrams. | ⅓ to 1 grain. |
| Extr. aconiti fol.; U. S. P., 70 | 3 to 12 centigrams. | ½ to 2 grains. |
| Extr. aconiti fol. fluid | 0.05 to 0.30 C. c. | 1 to 5 minims. |
| Extr. aconiti rad.; U. S. P. 80 | 5 to 15 milligrams. | $\frac{1}{12}$ to ¼ grain. |
| Extr. aconiti [rad.] fluid | 0.03 to 0.15 C. c. | ½ to 2½ minims. |
| Extr. aletridis fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. alni rubræ fl | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. aloës aquos | 3 to 20 centigrams. | ½ to 3 grains. |
| Extr. alston, constr. fl. | 4 to 15 C. c. | 1 to 4 fl. drachms. |
| Extr. angusturæ fl. | 1 to 3 C. c. | 15 to 45 minims. |
| Extr. angelicæ rad. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. anthemidis | 10 to 60 centigrams. | 2 to 10 grains. |
| Extr. anthemidis fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. apocyni andros fl. | 0.50 to 2 C. c. | 8 to 50 minims. |
| Extr. apocyni cannab. fl. | 0.50 to 2 C. c. | 8 to 30 minims. |
| Extr. araliæ hisp. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. araliæ nudic. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. araliæ racem. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. araliæ spin. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. arecæ fl. | 3 to 5 C. c. | 45 to 75 minims. |
| Extr. arnicæ flor. | 20 to 50 centigrams. | 3 to 8 grains. |
| Extr. arnicæ fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. arnicæ rad. | 10 to 30 centigrams. | 2 to 5 grains. |
| Extr. arnicæ rad. fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. aromat. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. ari triphylli fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. asari fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. asclep. incarn. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. asclep. syr. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. asclep. tuber. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. aspidii fl. | 5 to 15 C. c. | 1 to 4 fl. drachms. |
| Extr. aspidospermæ fl. | 1 to 3 C. c. | 15 to 45 minims. |
| Extr. aurantii cort. fl. | 1 to 10 C. c. | ¼ to 2½ fl. drachms. |
| Extr. azedarach fl. | 1 to 5 C. c. | 15 to 75 minims. |
| Extr. baptisiæ fl. | 0.50 to 2 C. c. | 7 to 30 minims. |
| Extr. bellad. fol (Eng.) | 1 to 4 centigrams, | 1/6 to ⅔ grain. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Extr. bellad. alcohol | 1 to 3 centigrams. | 1/6 to 1/2 grain. |
| Extr. bellad. fol. fl. | 0.20 to 0.40 C. c. | 3 to 6 minims. |
| Extr. bellad. rad. | 8 to 15 milligrams. | 1/8 to 1/4 grain. |
| Extr. bellad. rad. fl. | 0.10 to 0.20 C. c. | 1 to 3 minims. |
| Extr. berber. aquifol. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. berber. vulg. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. boldi fl. | 0.20 to 1 C. c. | 3 to 15 minims. |
| Extr. brayeræ fl. | 8 to 15 C. c. | 2 to 4 fl. drachms. |
| Extr. bryoniæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. buchu fl. | 2 to 10 C. c. | 1/2 to 2 1/2 fl. drachms. |
| Extr. calami fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. calend. fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. calumbæ | 20 to 60 centigrams. | 3 to 10 grains. |
| Extr. calumbæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. canellæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. cannab. Amer. fl. | 0.20 to 1 C. c. | 3 to 15 minims. |
| Extr. cannab. ind. | 1 to 3 centigrams. | 1/6 to 1/2 grain. |
| Extr. cannab. ind fl. | 0.20 to 0.40 C. c. | 3 to 6 minims. |
| Extr. cantharidis fl. | 0.06 to 0.20 C. c. | 1 to 3 minims. |
| Extr. capsici fl. | 0.6 to 0.20 C. c. | 1 to 3 minims. |
| Extr. cardam comp. fl. | 1 to 3 C. c. | 15 to 45 minims. |
| Extr. cardui bened. fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. carnis | 1 to 4 Gm. | 15 to 60 grains. |
| Extr. cascarillæ fl. | 3 to 10 C. c. | 3/4 to 2 1/2 fl. drachms. |
| Extr. castaneæ fl. | 3 to 10 C. c. | 3/4 to 2 1/2 fl. drachms. |
| Extr. catariæ fl. | 1 to 5 C. c. | 1/4 to 1 1/4 fl. drachms. |
| Extr. catechu liquid | 0.50 to 2 C. c. | 8 to 30 minims. |
| Extr. caulophylli fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. chelidonii fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. chelonis fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. chimaph. fl. | 3 to 5 C. c. | 3/4 to 1 1/4 fl. drachms. |
| Extr. chionanthi fl. | 3 to 10 C. c. | 3/4 to 2 1/2 fl. drachms. |
| Extr. chiratæ fl. | 2 to 5 C. c. | 1/4 to 1 1/4 fl. drachms. |
| Extr. cimicifugæ fl. | 0.50 to 2 C. c. | 8 to 30 minims. |
| Extr. cinchonæ | 1 to 2 Gm. | 15 to 30 grains. |
| Extr. cinchonæ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. cinchonæ arom. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. cinchonæ comp. fl. | 2 to 5 C. c. | 1/2 to 1 1/4 fl. drachms. |
| Extr. cocculi fl. | 0.05 to 0.20 C. c. | 1 to 3 minims. |
| Extr. colch. rad. | 2 to 10 centigrams. | 1/3 to 1 1/2 grains. |
| Extr. colch. rad. fl. | 0.20 to 1 C. c. | 3 to 15 minims. |
| Extr. colch. sem. fl. | 0.10 to 0.60 C. c. | 1 1/2 to 10 minims. |
| Extr. collinsoniæ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. colocynth | 10 to 30 centigrams. | 1 1/2 to 5 grains. |
| Extr. colocynth comp. | 10 to 30 centigrams. | 1 1/2 to 5 grains. |
| Extr. condurango | 0.50 to 2 C. c. | 8 to 30 minims. |
| Extr. conii fol. (Engl.) | 5 to 20 centigrams. | 1 to 4 grains. |
| Extr. conii fol. alc.; U.S.P. 70 | 5 to 10 centigrams. | 1 to 1 1/2 grains. |
| Extr. con [fr.] alc.; U.S.P. 80 | 2 to 6 centigrams. | 1/3 to 1 grain. |
| Extr. conii fol. fl | 0.20 to 1 C. c. | 3 to 15 minims. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Extr. con. [fr.] fl.; U.S. P. 80 | 0.10 to 0.30 C. c. | 1½ to 5 minims. |
| Extr. convallariæ rad. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. coptidis fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. corn. flor. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. corydalis fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. coto fl. | 0.20 to 1 C. c. | 3 to 15 minims. |
| Extr. cubebæ fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. cypripedii fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. damianæ fl. | 2 to 10 C. c. | ½ to 2½ fl. drachms. |
| Extr. delphinii fl. | 0.06 to 0.20 C. c. | 1 to 3 minims. |
| Extr. digitalis | 1 to 3 centigrams. | ⅙ to ½ grain. |
| Extr. digitalis fl. | 0.10 to 0.40 C. c. | 1 to 6 minims. |
| Extr. dioscoreæ fl. | 1 to 2 Gm. | 15 to 30 minims. |
| Extr. ditæ fl. | 5 to 15 C. c. | 1 to 4 fl. drachms. |
| Extr. dracontii fl. | 2 to 4 C. c. | 30 to 60 grains. |
| Extr. droseræ fl. | 0.30 to 0.60 C. c. | 5 to 10 minims. |
| Extr. dulcamaræ | 0.30 to 1 Gm. | 5 to 15 grains. |
| Extr. dulcamaræ fl. | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Extr. ergotæ | 10 to 50 centigrams. | 1½ to 8 grains. |
| Extr. ergotæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. eryodictyi fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. erythroxyli fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. eucalypti fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. euonymi fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. eupatorii fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. euphorb. ipec. fl. | 0.30 to 2 C. c. | 5 to 30 minims. |
| Extr. ferri pom. | 0.20 to 1 Gm. | 3 to 15 grains. |
| Extr. frangulæ fl. | 2 to 10 C. c. | ½ to 2½ fl. drachms. |
| Extr. frankeniæ fl. | 0.50 to 1 C. c. | 8 to 15 minims. |
| Extr. gallæ fl. | 3 to 8 C. c. | ¾ to 2 fl. drachms. |
| Extr. gelsemii | 0.10 to 0.50 C. c. | 2 to 8 minims. |
| Extr. gelsemii fl. | 0.10 to 0.50 C. c. | 1 to 8 minims. |
| Extr. gent. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. gent. comp. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. gent. quinquefl. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. geranii fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. gei fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. gilleniæ fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. gossypii fl. | 1 to 3 C. c. | 15 to 45 minims. |
| Extr. granati rad. cort. fl. | 3 to 8 C. c. | ¾ to 2 fl drachms. |
| Extr. grind. rob. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. grind. squarr. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. guaiaci ligni fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. guaranæ fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. hæmotoxyli | 0.50 to 2 Gm. | 8 to 30 grains. |
| Extr. hæmotoxyli fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. hamamelid. fl. | 2 to 6 C. c. | 30 to 90 minims. |
| Extr. helleb. nigris. | 3 to 20 centigrams. | ½ to 3 grains. |
| Extr. helleb. nigris fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. heloniæ fl. | 0.50 to 2 C. c. | 8 to 30 minims. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Extr. hepaticæ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. humuli | 0.20 to 1 Gm. | 3 to 15 grains. |
| Extr. humuli fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. hydrangeæ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. hydrastis | 20 to 60 centigrams. | 3 to 10 grains. |
| Extr. hydrastis fl. | 0.50 to 2 C. c. | 8 to 30 minims. |
| Extr. hyoscyami (Engl.) | 5 to 25 centigrams. | 1 to 4 grains. |
| Extr. hyoscyami alc. | 5 to 10 centigrams. | 1 to 2 grains. |
| Extr. hyoscyami fol. fl. | 0.20 to 1 C. c. | 3 to 15 minims. |
| Extr. hyoscyami sem. fl. | 0.10 to 0.50 C. c. | 2 to 8 minims. |
| Extr. ignatiæ | 2 to 8 centigrams. | ⅓ to 1¼ grains. |
| Extr. ignatiæ fl. | 0.05 to 0.30 C. c. | 1 to 6 minims. |
| Extr. ipecac fl. | 0.20 to 4 C. c. | 3 to 60 minims. |
| Extr. iridis versicol. | 0.20 to 0.30 Gm. | 3 to 6 grains. |
| Extr. irid. versicol. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. jalapæ; U. S. P., 1870. | 30 to 60 centigrams. | 5 to 10 grains. |
| Extr. jalapæ alc. | 20 to 40 centigrams. | 3 to 6 grains. |
| Extr. jalapæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. juglandis | 1 to 2 Gm. | 15 to 30 grains. |
| Extr. juglandis fl. | 3 to 8 C. c. | ¾ to 2 fl. drachms. |
| Extr. junip. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. kamali fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. kino, liquid | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. krameriæ | 0.30 to 1 Gm. | 5 to 15 grains. |
| Extr. krameriæ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. lactucæ | 0.30 to 1 Gm. | 5 to 15 grains. |
| Extr. lactucæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. lactucarii fl. | 0.50 to 2 C. c. | 8 to 30 minims. |
| Extr. lappæ fl. | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Extr. laricis fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. leonuri fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. leptandræ. | 20 to 60 centigrams. | 3 to 10 grains. |
| Extr. leptandræ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. lobeliæ fl. | 0.30 to 2 C. c. | 5 to 30 C. c. |
| Extr. lobeliæ sem. fl. | 0.20 to 1 C. c. | 3 to 15 C. c. |
| Extr. lupulini fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. lycopi fl. | 0.30 to 2 C. c. | 5 to 30 minims. |
| Extr. malti | 5 to 10 Gm. | 1 to 2½ drachms. |
| Extr. manzanitæ fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. marrubii fl. | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Extr. matico fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. matricariæ fl. | 0.50 to 2 C. c. | 8 to 30 minims. |
| Extr. menispermi fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. methystice fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. mezerei | 3 to 6 centigrams. | ½ to 1 grain. |
| Extr. mezerei fl. | 0.20 to 0.60 C. c. | 3 to 10 minims. |
| Extr. micromeriæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. mitchellæ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. myricæ fl. | 2 to 4 C. c. | 30 to 60 minims, |
| Extr. nectandræ fl. | 4 to 15 C. c. | 1 to 4 fl. drachms. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Extr. nuc. vom. | 2 to 10 centigrams. | ⅓ to 1½ grains. |
| Extr. nuc. vom. fl. | 0.06 to 0.30 C. c. | 1 to 5 minims. |
| Extr. nuphar fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. nymphæa fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. œnotheræ fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. opii | 1 to 3 centigrams. | ⅙ to ½ grain. |
| Extr. papaveris | 3 to 12 centigrams. | ½ to 2 grains. |
| Extr. papaveris fl. | 1 to 3 C. c. | 15 to 45 minims. |
| Extr. pareiræ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. petroselini fl. | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Extr. phellandrii fl. | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Extr. phoradendri fl. | 2 to 4 C. c. | ½ to 1 fl. drachm. |
| Extr. physostigmæ | 4 to 10 milligrams. | 1/15 to ⅙ grain. |
| Extr. physostigmæ fl. | 0.06 to 0.20 C. c. | 1 to 3 minims. |
| Extr. phytolaccæ baccar fl. | 0.30 to 2 C. c. | 5 to 30 minims. |
| Extr. phytolaccæ rad. | 6 to 20 centigrams. | 1 to 3 grains. |
| Extr. phytolaccæ rad. fl. | 0.30 to 2 C. c. | 5 to 30 minims. |
| Extr. pilocarpi fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. pimentæ fl. | 1 to 3 C. c. | 15 to 45 minims. |
| Extr. piper nigr. fl. | 1 to 3 C. c. | 15 to 45 minims. |
| Extr. piscidiæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. podophylli | 3 to 10 centigrams. | ½ to 1½ grains. |
| Extr. podophylli fl. | 0.50 to 2 C. c. | 8 to 30 minims. |
| Extr. polygoni fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. polygonati fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. populi fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. prinos fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. prun. virg. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. pteleæ fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. pulsatillæ fl. | 0.10 to 0.30 C. c. | 2 to 5 minims. |
| Extr. quassiæ | 6 to 30 centigrams. | 1 to 5 grains. |
| Extr. quassiæ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. quercus fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. rhamni cath. ft. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. rhamni pursh. cort. fl. | 2 to 8 C. c. | 30 to 120 minims. |
| Extr. rhei | 0.30 to 1 Gm. | 5 to 15 grains. |
| Extr. rhei fl. | 1 to 3 C. c. | 15 to 45 minims. |
| Extr. rhois arom. fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. rhois glabr. cort. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. rhois glabr. fruct. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. rhois toxicol. fl. | 0.06 to 0.40 C. c. | 1 to 6 minims. |
| Extr. ricini fol. fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. rosæ fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. rubi fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. rumicis fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. rutæ fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. sabbatiæ fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. sabinæ fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. salicis fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. salviæ fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Extr. sambuci fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. sanguin fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. santali citr. fl. | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Extr. santonicæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. sarsap. fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. compt. fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. sassafras fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. scillæ fl. | 0.30 to 2 C. c. | 5 to 30 minims. |
| Extr. scillæ comp. fl. | 0.30 to 2 C. c. | 5 to 30 minims. |
| Extr. scoparii fl. | 2 to 4 C. c. | ½ to 1 fl. drachm. |
| Extr. scutellariæ fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. senecionis fl. | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Extr. senegæ fl. | 0.50 to 1 C. c. | 8 to 15 minims. |
| Extr. sennæ fl. | 4 to 15 C. c. | 1 to 4 fl. drachms. |
| Extr. serpent. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. simarubæ fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. solidag. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. spigeliæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. spigeliæ et sennæ fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. stillingiæ fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. stillingiæ comp, fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. stramonii (Engl.) | 3 to 6 centigrams. | ½ to 1 grain. |
| Extr. stramonii fol. alc. | 2 to 4 centigrams. | ⅓ to ⅔ grain. |
| Extr. stramonii sem. | 1 to 3 centigrams, | 1/6 to ½ grain. |
| Extr. stramonii fl. | 0.06 to 0.40 C. c. | 1 to 6 minims. |
| Extr. sumbul fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. taraxaci | 0.30 to 1 Gm. | 5 to 15 grains. |
| Extr. taraxaci fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. thujæ fl. | 0.50 to 1 C. c. | 8 to 15 minims. |
| Extr. toxicodendri fl. | 0.06 to 0.30 C. c. | 1 to 5 minims. |
| Extr. trifol. prat, fl. | 4 to 8 C. c. | 1 to 2 fl. drachm. |
| Extr. trillii fl. | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Extr. trit. rep. fl. | 4 to 15 C. c. | 1 to 4 fl. drachms. |
| Extr. tussilag. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. urticæ rad. fl. | 0.30 to 1 C. c. | 5 to 15 minims. |
| Extr. ustilag. maid. fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. uvæ ursi fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. vaccin. crassifol. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. valer. | 0.30 to 1 Gm. | 5 to 15 grains. |
| Extr. valer. fl. | 2 to 4 C. c. | 30 to 60 minims. |
| Extr. veratr. vir. fl. | 0.10 to 0.50 C. c. | 2 to 8 minims. |
| Extr. verbenæ fl. | 1 to 4 C. c. | 15 to 60 minims. |
| Extr. viburni opuli fl. | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Extr. viburni [prunifol.] fl. | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Extr. xanthoxyli cort. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. xanthoxyli fruct. fl. | 1 to 2 C. c. | 15 to 30 minims. |
| Extr. zingiberis fl. | 0.50 to 2 C. c. | 8 to 30 minims. |
| Fel bovis purif. | 20 to 40 centigrams. | 3 to 6 grains, |
| Ferri arsen. | 3 to 30 milligrams. | 1/20 to ½ grain. |
| Ferri benzoas | 5 to 30 centigrams. | 1 to 5 grains. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Ferri bromid | 5 to 30 centigrams. | 1 to 5 grains. |
| Ferri carb. sacch. | 0.25 to 1 Gm. | 4 to 15 grains. |
| Ferri chlorid. | 5 to 20 centigrams. | 1 to 3 grains. |
| Ferri citr. | 30 to 60 centigrams. | 5 to 10 grains. |
| Ferri et ammon. citr. | 30 to 60 centigrams. | 5 to 10 grains. |
| Ferri et ammon. sulph. | 30 to 60 centigrams. | 5 to 10 grains. |
| Ferri et ammon. tartr | 0.30 to 1 Gm. | 5 to 15 grains. |
| Ferri et cinchonid. citr | 30 to 60 centigrams. | 5 to 10 grains. |
| Ferri et pot. tartr | 1 to 4 Gm. | 15 to 60 grains. |
| Ferri et quin. citr. | 30 to 60 centigrams. | 5 to 10 grains. |
| Ferri et strychn. citr | 5 to 30 centigrams. | 1 to 5 grains. |
| Ferri ferrocyanid | 20 to 30 centigrams. | 3 to 5 grains. |
| Ferri hypophosphis | 30 to 60 centigrams. | 5 to 10 grains. |
| Ferri iodidum | 5 to 30 centigrams. | 1 to 5 grains. |
| Ferri iodidum sacch | 10 to 60 centigrams. | 2 to 10 grains. |
| Ferri lactas | 5 to 20 centigrams. | 1 to 3 grains. |
| Ferri oxalas | 5 to 20 centigrams. | 1 to 3 grains. |
| Ferri oxid. magnet | 30 to 60 centigrams. | 5 to 10 grains. |
| Ferri oxid. hydrat | 15 to 60 Gm. | ½ to 2 ounces. |
| Ferri phosphas | 5 to 30 centigrams. | 1 to 5 grains. |
| Ferri pyrophosphas | 5 to 30 centigrams. | 1 to 5 grains. |
| Ferri subcarb | 0.30 to 2 Gm. | 5 to 30 grains. |
| Ferri sulphas | 5 to 20 centigrams. | 1 to 3 grains. |
| Ferri sulphas exsiccat | 3 to 10 centigrams. | ½ to 1½ grains. |
| Ferri valer | 5 to 20 centigrams. | 1 to 3 grains. |
| Ferrum dialys | 0.06 to 1 C. c. | 1 to 15 minims. |
| Ferrum reduct | 6 to 30 centigrams. | 1 to 5 grains. |
| Guarana. | 0.50 to 2 Gm. | 8 to 30 grains. |
| Hydrarg. chlorid. corros | 1 to 6 milligrams. | $\frac{1}{64}$ to $\frac{1}{10}$ grain. |
| Hydrarg. chlorid. mite | 1 to 50 centigrams. | ⅙ to 8 grains. |
| Hydrarg cyanid | 4 to 30 milligrams. | $\frac{1}{16}$ to ½ grain. |
| Hydrarg. iodid. flav | 1 to 6 centigrams. | ⅙ to 1 grain. |
| Hydrarg. iodid. rubr | 4 to 30 milligrams. | $\frac{1}{16}$ to ½ grain. |
| Hydrarg. iodid. vir | 1 to 6 centigrams. | ⅙ to 1 grain. |
| Hydrarg. oxid. flav | 4 to 30 milligrams. | $\frac{1}{16}$ to ½ grain. |
| Hydrarg. oxid. nigr | 6 to 60 milligrams. | $\frac{1}{10}$ to 1 grain. |
| Hydrarg. oxid. rubr | 4 to 30 milligrams. | $\frac{1}{16}$ to ½ grain. |
| Hydrarg. subsulphas flav | 15 to 60 milligrams. | ¼ to 1 grain. |
| Hydrarg. c. creta | 15 to 50 centigrams. | 3 to 8 grains. |
| Hyoscyamiina, and salts | 0.50 to 2 milligrams. | $\frac{1}{138}$ to $\frac{1}{32}$ grain. |
| Infusum brayeræ | 60 to 250 C. c | 2 to 8 fl. ounces. |
| Infusum digitalis | 8 to 15 C. c. | 2 to 4 fl. drachms. |
| Infusum sennæ comp | 30 to 60 C. c. | 1 to 2 fl. ounces. |
| Iodoformum | 5 to 20 centigrams. | 1 to 3 grains. |
| Iodum | 1 to 3 centigrams. | ⅙ to ½ grain. |
| Ipecacuanha { expect | 1 to 6 centigrams. | ⅙ to 1 grain. |
| Ipecacuanha { emet | 1 to 2 Gm. | 15 to 30 grains. |
| Jalapa | 1 to 2 Gm. | 15 to 30 grains. |
| Kamala, | 4 to 8 Gm. | 1 to 2 drachms. |
| Kino | 0.50 to 2 Gm. | 8 to 30 grains. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Lactucarium | 0.50 to 1 Gm | 8 to 15 grains. |
| Liq. ammon. acet | 8 to 30 C. c | 2 to 8 fl. drachms. |
| Liq. acidi arseniosi | 0.10 to 0.50 C. c | 2 to 7 minims. |
| Liq. arsen. et hydr. iod | 0.10 to 0.50 C. c | 2 to 7 minims. |
| Liq. ferri chloridi | 0.10 to 0.60 C. c | 2 to 10 minims. |
| Liq. ferri dialys | 0.06 to 1 C. c | 1 to 15 minims. |
| Liq. ferri nitrat | 0.50 to 1 C. c | 8 to 15 minims. |
| Liq. pepsini | 8 to 15 C. c | 2 to 4 fl. drachms. |
| Liquor potassæ | 0.30 to 2 C. c. | 5 to 30 minims. |
| Liquor potassii arsenit | 0.15 to 0.50 C. c. | 3 to 7 minims. |
| Liquor potassii citrat | 8 to 15 C. c | 2 to 4 fl. drachms. |
| Liquor sodæ | 0.30 to 2 C. c | 5 to 30 minims. |
| Liquor sodii arseniatis | 0.15 to 0.50 C. c | 3 to 7 minims. |
| Lithii benzoas | 10 to 30 centigrams. | 2 to 5 grains. |
| Lithii bromid | 6 to 20 centigrams. | 1 to 3 grains. |
| Lithii carb | 10 to 40 centigrams. | 2 to 6 grains. |
| Lithii citr | 10 to 30 centigrams. | 2 to 5 grains. |
| Lithii salicylas | 10 to 50 centigrams. | 2 to 8 grains. |
| Lupulinum | 30 to 60 centigrams. | 5 to 10 grains. |
| Magnesia | 1 to 4 Gm | 15 to 60 grains. |
| Magnesii carb | 1 to 4 Gm | 15 to 60 grains. |
| Magnesii citr. gran | 8 to 30 Gm | 2 to 8 drachms. |
| Magnesii sulphas | 8 to 30 Gm | 2 to 8 drachms. |
| Magnesii sulphis | 0.50 to 2 Gm | 8 to 30 grains. |
| Mangani sulphas | 10 to 60 centigrams. | 2 to 10 grains. |
| Manna | 30 to 60 Gm | 1 to 2 ounces. |
| Massa copaibæ | 0.30 to 2 Gm | 5 to 30 grains. |
| Massa ferri carb | 0.30 to 1 Gm | 5 to 15 grains. |
| Massa hydrarg | 0.06 to 1 Gm | 1 to 15 grains. |
| Mist. ammoniaci | 15 to 30 C. c | 4 to 8 fl. drachms. |
| Mist. asafœtidæ | 15 to 30 C. c | 4 to 8 fl. drachms. |
| Mist. chloroformi | 15 to 30 C. c | 4 to 8 fl. drachms. |
| Mist. cretæ | 30 to 60 C. c | 1 to 2 fl. ounces |
| Mist. ferri comp | 15 to 60 C. c | ½ to 2 fl. ounces. |
| Mist. ferri et ammon. acet. | 15 to 30 C. c | ½ to 1 fl. ounce. |
| Mist. glycrrh. comp | 4 to 15 C. c | 1 to 4 fl. drachms. |
| Mist. magnes. et asafœt | 4 to 15 C. c | 1 to 4 fl. drachms. |
| Mist. potassii citr. | 15 to 60 C. c | ½ to 2 fl. ounces. |
| Mist. rhei et sodæ | 15 to 30 C. c | ½ to 1 fl. ounce. |
| Morphina, and its salts. | 4 to 30 milligrams. | $\frac{1}{16}$ to ½ grain. |
| Moschus | 0.10 to 1 Gm | 2 to 15 grains. |
| Narceina | 1 to 10 centigrams. | ⅙ to 2 grains. |
| Nitroglycerinum | 1 to 4 milligrams. | $\frac{1}{64}$ to $\frac{1}{16}$ grain. |
| Nux vomica | 5 to 30 centigrams. | 1 to 5 grains. |
| Oleoresina aspidii | 1 to 4 Gm | 15 to 60 grains. |
| Oleoresina capsici | 1 to 3 milligrams. | ⅙ to ½ grain. |
| Oleoresina cubebæ | 0.30 to 2 Gm | 5 to 30 grains. |
| Oleoresina lupulini | 10 to 30 centigrams. | 2 to 5 grains. |
| Oleoresina piperis | 6 to 20 centigrams. | 1 to 3 grains. |
| Oleoresina zingiberis | 6 to 20 centigrams. | 1 to 3 grains. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Oleum copaibæ | 0.50 to 1 C. c | 8 to 15 minims. |
| Oleum cubebæ | 1 to 2 C. c | 15 to 30 minims. |
| Oleum eriger | 0.30 to 1 C. c | 5 to 15 minims. |
| Oleum eucalypti | 0.60 to 2 C. c | 10 to 30 minims. |
| Oleum phosphoratum | 5 to 20 centigrams. | 1 to 3 grains. |
| Oleum sabinæ | 0.06 to 0.20 C. c | 1 to 3 minims. |
| Oleum terebinth | 0.30 to 2 C. c | 5 to 30 minims. |
| Oleum tiglii | 1 to 10 centigrams. | 1/6 to 1½ grains. |
| Opium (14% morphine) | 1 to 10 centigrams. | 1/6 to 1½ grains. |
| Pepsinum purum | 1 to 15 Gm | 15 grains to ½ ounce. |
| Pepsinum saccharatum | 2 to 30 Gm | 30 grains to 1 ounce. |
| Phosphorus | 0.50 to 3 milligrams. | 1/128 to 1/20 grain. |
| Physostigminæ salicylas | 0.50 to 1 milligram | 1/120 to 1/64 grain. |
| Physostigminæ sulphas | 0.50 to 1 milligram | 1/128 to 1/64 grain. |
| Picrotoxinum | 1 to 8 milligrams. | 1/64 to 1/8 grain. |
| Pilocarpina (and salts) | 1 to 30 milligrams. | 1/64 to ½ grain. |
| Pil. aloes | 1 to 3 pills | 1 to 3 pills. |
| Pil. aloes et asafœt | 2 to 5 pills | 2 to 5 pills. |
| Pil. aloes et ferri | 1 to 3 pills | 1 to 3 pills. |
| Pil. aloes et mast | 1 to 3 pills | 1 to 3 pills. |
| Pil. aloes et myrrhæ | 2 to 5 pills | 2 to 5 pills. |
| Pil. antimon. comp | 1 to 3 pills | 1 to 3 pills. |
| Pil. asafœtidæ | 1 to 6 pills | 1 to 6 pills. |
| Pil. cathart. comp | 1 to 4 pills | 1 to 4 pills. |
| Pil. ferri comp | 2 to 5 pills | 2 to 5 pills. |
| Pil. ferri iodidi | 1 to 4 pills | 1 to 4 pills. |
| Pil. galbani comp | 1 to 5 pills | 1 to 5 pills. |
| Pil. opii | 1 to 2 pills | 1 to 2 pills. |
| Pil. phosphori | 1 to 4 pills | 1 to 4 pills. |
| Pil. rhei | 2 to 5 pills | 2 to 5 pills. |
| Pil. rhei comp | 2 to 5 pills | 2 to 5 pills. |
| Piperinum | 5 to 50 centigrams. | 1 to 8 grains. |
| Plumbi acetas | 3 to 20 centigrams. | ½ to 3 grains. |
| Plumbi iodidum | 3 to 20 centigrams. | ½ to 3 grains. |
| Potassii acetas | 1 to 4 Gm | 15 to 60 grains. |
| Potassii bicarb | 0.50 to 4 Gm | 8 to 60 grains. |
| Potassii bitartr | 4 to 8 Gm | 1 to 2 grains. |
| Potassii bromid | 0.50 to 4 Gm | 8 to 60 grains. |
| Potassii carb | 0.50 to 2 Gm | 8 to 30 grains, |
| Potassii chloras | 0.50 to 2 Gm | 8 to 30 grains. |
| Potassii citras | 1 to 4 Gm | 15 to 60 grains. |
| Potassii cyanid | 4 to 8 milligrams | 1/16 to 1/8 grain. |
| Potassii et sodii tartr | 15 to 30 Gm | ½ to 1 ounce. |
| Potassii hypophosphis | 0.30 to 1 Gm | 5 to 15 grains. |
| Potassii iodid | 0.10 to 1 Gm | 2 to 15 grains. |
| Potassii nitras | 0.50 to 1 Gm | 8 to 15 grains. |
| Potassii sulphas | 4 to 15 Gm. | 1 to 4 drachms. |
| Potassii sulphidum | 5 to 60 centigrams. | 1 to 10 grains. |
| Potassii sulphis | 1 to 2 Gm. | 15 to 30 grains. |
| Potassii tartras | 5 to 30 Gm. | 1 to 8 drachms. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Pulv. antimonialis | 15 to 60 centigrams. | 3 to 10 grains. |
| Pulv. aromat. | 0.50 to 2 Gm. | 8 to 30 grains. |
| Pulv. cretæ comp. | 0.50 to 2 Gm. | 8 to 30 grains. |
| Pulv. glycyrrh. comp. | 2 to 4 Gm. | 30 to 60 grains. |
| Pulv. ipecac et opii | 0.30 to 1 Gm. | 5 to 15 grains. |
| Pulv. jalapæ comp. | 2 to 4 Gm. | 30 to 60 grains. |
| Pulv. morphinæ comp. | 0.50 to 1 Gm. | 8 to 15 grains. |
| Pulv. rhei comp. | 2 to 4 Gm. | 30 to 60 grains. |
| Quinidina (and salts) | 0.05 to 2 Gm. | 1 to 30 grains. |
| Quinina (and salts) | 0.05 to 2 Gm. | 1 to 30 grains. |
| Quininæ arsenias | 1 to 5 centigrams. | 1/6 to 1 grain. |
| Resina copaibæ | 10 to 60 centigrams. | 2 to 10 grains. |
| Resina jalapæ | 10 to 30 centigrams. | 2 to 5 grains. |
| Resina podophylli | 8 to 30 milligrams. | 1/8 to 1/2 grain. |
| Resina scammonii | 10 to 60 centigrams. | 2 to 10 grains. |
| Rheum | 0.10 to 2 Gm. | 2 to 30 grains. |
| Salicinum | 0.50 to 2 Gm. | 8 to 30 grains. |
| Santonica | 0.50 to 4 Gm. | 8 to 60 grains. |
| Santoninum | 6 to 30 centigrams. | 1 to 5 grains. |
| Sapo | 0.30 to 2 Gm. | 5 to 30 grains. |
| Scammonium | 0.20 to 1 Gm. | 3 to 15 grains. |
| Senna | 0.50 to 4 Gm. | 8 to 60 grains. |
| Sodii acetas | 1 to 4 Gm. | 15 to 60 grains. |
| Sodii arsenias | 1 to 6 milligrams. | 1/64 to 1/10 grain. |
| Sodii benzoas | 0.30 to 1 Gm. | 5 to 15 grains. |
| Sodii bicarb. | 0.50 to 2 Gm. | 8 to 30 grains. |
| Sodii bisulphis | 0.50 to 2 Gm. | 8 to 30 grains. |
| Sodii boras | 0.50 to 2 Gm. | 8 to 30 grains. |
| Sodii bromid. | 0.50 to 2 Gm. | 8 to 30 grains. |
| Sodii carb. | 0.50 to 2 Gm. | 8 to 30 grains. |
| Sodii carb. exsicc. | 0.30 to 1 Gm. | 5 to 15 grains. |
| Sodii chloras | 0.30 to 2 Gm. | 5 to 30 grains. |
| Sodii hypophosphis | 0.50 to 1 Gm. | 8 to 15 grains. |
| Sodii hyposulphis | 0.50 to 2 Gm. | 8 to 30 grains. |
| Sodii iodidum | 0.30 to 1 Gm. | 5 to 15 grains. |
| Sodii phosphas | 0.10 to 1 Gm. | 2 to 15 grains. |
| Sodii salicylas | 0.30 to 2 Gm. | 5 to 30 grains. |
| Sodii santoninas | 15 to 60 centigrams. | 2 to 10 grains. |
| Sodii sulphas | 4 to 30 Gm. | 1 to 2 grains. |
| Sodii sulphis | 0.50 to 2 Gm. | 8 to 30 grains. |
| Spir. æther. | 2 to 4 C. c. | 30 to 60 minims. |
| Spir. æther. nitrosi | 2 to 8 C. c. | 1/2 to 2 fl. drachms. |
| Spir. ammoniæ | 0.50 to 2 C. c. | 8 to 30 minims. |
| Spir. ammoniæ arom. | 1 to 4 C. c. | 15 to 60 minims. |
| Spir. camphoræ | 0.50 to 2 C. c. | 8 to 30 minims. |
| Spir. chloroformi | 1 to 4 C. c. | 15 to 60 minims. |
| Spir. lavend. comp. | 2 to 4 C. c. | 30 to 60 minims. |
| Spir. menth. pip. | 2 to 4 C. c. | 30 to 60 minims. |
| Strychnina (and salts) | 1 to 5 milligrams. | 1/64 to 1/12 grain. |
| Sulphur | 2 to 15 Gm. | 1/2 to 4 drachms. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Syrupus acidi hydroiodici. | | |
| Syrupus allii . . . . . | 5 to 15 C. c. . . | 1 to 4 fl. drachms. |
| Syrupus calcii lactophos . | 5 to 10 C. c. . . | 1 to 2 fl. drachms. |
| Syrupus calcis . . . . | 1 to 2 C. c. . . | 15 to 30 minims. |
| Syrupus ferri bromidi . . | 1 to 4 C. c. . . | 15 to 60 minims. |
| Syrupus ferri iodidi . . | 1 to 4 C. c. . . | 15 to 60 minims. |
| Syrupus ferri oxidi . . . | 5 C. c. . . . . | 1 fl. drachm. |
| Syrupus ferri hypophosph. | 5 C. c. . . . . | 1 fl. drachm. |
| Syr. fer., quin et str. phos. | 5 C. c. . . . . | 1 fl. drachm. |
| Syrupus hypophosphit. . | 5 C. c. . . . . | 1 fl. drachm. |
| Syrupus hypophos. c. fer. | 5 C. c. . . . . | 1 fl. drachm. |
| Syrupus ipecac . . . . | 2 to 15 C. c. . . | ½ to 4 fl. drachms. |
| Syrupus krameriæ . . . | 2 to 15 C. c. . . | ½ to 4 fl. drachms. |
| Syrupus lactucarii . . . | 5 to 10 C. c. . . | 1 to 3 fl. drachms. |
| Syrupus rhei . . . . . | 4 to 15 C. c. . . | 1 to 4 fl. drachms. |
| Syrupus rhei arom. . . | 4 to 15 C. c. . . | 1 to 4 fl. drachms. |
| Syrupus rosæ . . . . | 4 to 8 C. c. . . | 1 to 2 fl. drachms. |
| Syrupus rubi . . . . . | 4 to 8 C. c. . . | 1 to 2 fl. drachms. |
| Syrupus sarsap. comp. . | 4 to 15 C. c. . . | 1 to 4 fl. drachms. |
| Syrupus scillæ . . . . | 2 to 4 C. c. . . | ½ to 1 fl. drachm. |
| Syrupus scillæ comp. . . | 1 to 4 C. c. . . | 15 to 60 minims. |
| Syrupus senegæ . . . | 4 to 8 C. c. . . | 1 to 2 fl. drachms. |
| Syrupus sennæ . . . . | 5 to 15 C. c. . . | 1 to 4 fl. drachms. |
| Tinct. aconiti fol. . . . | 0.50 to 1 C. c. . . | 8 to 16 minims. |
| Tinct. aconiti rad. . . . | 0.06 to 0.30 C. c. . | 1 to 5 minims. |
| Tinct. acon. rad. Fleming's | 0.04 to 0.15 C. c. . | ⅔ to 2½ minims. |
| Tinct. aloes (1880) . . . | 2 to 8 C. c. . . . | ½ to 2 fl. drachms. |
| Tinct. aloes et myrrhæ . | 4 to 8 C. c. . . . | 1 to 2 fl. drachms. |
| Tinct. arnicæ flor. . . . | 0.50 to 2 C. c. . . | 8 to 30 minims. |
| Tinct. arnicæ rad. . . . | 1 to 2 C. c. . . | 15 to 30 minims. |
| Tinct. asafœtidæ . . . | 2 to 4 C. c. . . | 30 to 60 minims. |
| Tinct. belladonnæ . . . | 0.30 to 1 C. c. . . | 8 to 15 minims. |
| Tinct. bryoniæ . . . . | 1 to 2 C. c. . . | 15 to 30 minims. |
| Tinct. calendulæ . . . | 1 to 2 C. c. . . | 15 to 30 minims. |
| Tinct. calumbæ . . . . | 3 to 15 C. c. . . | 1 to 4 fl. drachms. |
| Tinct. cannabis ind. . . | 1 to 2 C. c. . . | 15 to 30 minims. |
| Tinct. cantharid. . . . | 0.50 to 1 C. c. . . | 8 to 15 minims. |
| Tinct. capsici . . . . | 0.50 to 1 C. c. . . | 8 to 15 minims. |
| Tinct. catechu comp. . . | 2 to 8 C. c. . . | ½ to 2 fl. drachms. |
| Tinct. chiratæ . . . . | 1 to 4 C. c. . . | 15 to 60 minims. |
| Tinct. cimicifugæ . . . | 2 to 4 C. c. . . | 30 to 60 minims. |
| Tinct. cinchonæ . . . | 2 to 8 C. c. . . | ½ to 2 fl. drachms. |
| Tinct. cinchonæ comp. . | 2 to 8 C. c. . . | ½ to 2 fl. drachms. |
| Tinct. colchici rad. . . . | 0.30 to 1 C. c. . . | 5 to 15 minims. |
| Tinct. colchici sem. . . | 0.30 to 1 C. c. . . | 5 to 15 minims. |
| Tinct. conii . . . . . | 0.30 to 2 C. c. . . | 5 to 30 minims. |
| Tinct. croci . . . . . | 4 to 8 C. c. . . | 1 to 2 fl. drachms. |
| Tinct. cubebæ . . . . | 4 to 8 C. c. . . | 1 to 2 fl. drachms. |
| Tinct. digitalis . . . . | 0.30 to 1 C. c. . . | 6 to 15 minims. |
| Tinct. ferri acet. . . . | 1 to 2 C. c. . . | 15 to 30 minims. |

DOSE TABLE CONTINUED.

| Remedies. | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Tinct. ferri chloridi | 1 to 2 C. c. | 15 to 30 minims. |
| Tinct. ferri chloridi æther. | 1 to 2 C. c. | 15 to 30 minims, |
| Tinct. ferri pomati | 2 to 4 C. c. | 20 to 60 minims. |
| Tinct. gallæ | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. gelsemii | 0.50 to 1 C. c | 8 to 15 minims. |
| Tinct. guaiaci | 2 to 4 C. c. | 30 to 60 minims. |
| Tinct. guaiaci ammon. | 2 to 4 C. c. | 30 to 60 minims. |
| Tinct. hellebori | 0.60 to 1 C. c | 10 to 15 minims. |
| Tinct. humuli | 4 to 10 C. c. | 1 to 2½ fl. drachms. |
| Tinct. hydrastis | 2 to 6 C. c. | 30 to 90 minims. |
| Tinct. hyoscyami fol | 1 to 4 C. c. | 15 to 60 minims. |
| Tinct. hyoscyami sem | 1 to 2 C. c. | 15 to 30 minims. |
| Tinct. ignatiæ | 0.30 to 1 C. c | 5 to 15 minims. |
| Tinct. iodi | 0.30 to 1 C. c | 5 to 15 minims. |
| Tinct. ipecac. et opii | 0.30 to 1 C. c | 5 to 15 minims. |
| Tinct. jalapæ | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. kino | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. krameriæ | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. lavend. comp | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. lobeliæ | 1 to 3 C. c. | 15 to 45 minims. |
| Tinct. lupulini | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. matico | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. moschi | 1 to 4 C. c. | 15 to 60 minims. |
| Tinct. nux vomicæ | 0.50 to 3 C. c | 8 to 45 minims. |
| Tinct. opii | 0.30 to 1 C. c | 5 to 15 minims. |
| Tinct. opii camph | 0.50 to 5 C. c | 8 to 75 minims. |
| Tinct. phytolaccæ | 0.50 to 4 C. c | 8 to 60 minims. |
| Tinct. physostigmatis | 0.30 to 1 C. c | 5 to 15 minims. |
| Tinct. pyrethri | 0.50 to 2 C. c | 8 to 30 minims. |
| Tinct. quassiæ | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. rhei | 4 to 30 C. c. | 1 to 8. fl. drachms. |
| Tinct. rhei arom | 2 to 5 C. c. | 30 to 75 minims. |
| Tinct. rhei dul | 4 to 15 C. c. | 1 to 4 fl. drachms. |
| Tinct. sanguinariæ | 1 to 4 C. c. | 15 to 60 minims. |
| Tinct. scillæ | 0.50 to 4 C. c | 8 to 60 minims. |
| Tinct. serpentariæ | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. stramon. fol | 0.50 to 1 C. c | 8 to 15 minims. |
| Tinct. stramon. sem | 0.30 to 1 C. c | 6 to 15 minims. |
| Tinct. sumbul | 0.50 to 2 C. c | 8 to 30 minims. |
| Tinct. valer | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. valer. ammon | 2 to 8 C. c. | ½ to 2 fl. drachms. |
| Tinct. veratr. vir | 0.20 to 0.60 C. c. | 3 to 10 minims. |
| Tinct. zingiberis | 1 to 4 C. c. | 15 to 60 minims. |
| Tritur. elaterini | 8 to 30 milligrams. | ⅛ to ½ grain. |
| Veratrina | 1 to 6 milligrams. | $\frac{1}{64}$ to $\frac{1}{10}$ grain. |
| Vin. aloes | 4 to 8 C. c. | 1 to 2 fl. drachms. |
| Vin. antim expect. et alt | 0.06 to 0.50 C. c. | 1 to 8 minims. |
| Vin. antim emet | 2 to 5 C. c. | 30 to 75 minims. |
| Vin. colch. rad | 0.50 to 3 C. c | 8 to 45 minims. |
| Vin. colch. sem | 0.30 to 2 C. c | 5 to 30 minims. |

DOSE TABLE CONTINUED.

| Remedies | Dose in metric weights or measures. | Dose in apothecaries' weights or measures. |
|---|---|---|
| Vin. ergotæ | 4 to 12 C. c | 1 to 3 fl. drachms. |
| Vin. ferri amar | 5 C. c | 1 fl. drachm. |
| Vin. ferri citrat | 5 C. c | 1 fl. drachm. |
| Vin. ipecac. expect | 0.30 to 1 C. c | 5 to 15 minims. |
| Vin. ipecac. emet | 10 to 25 C. c | 3 to 6 fl. drachms. |
| Vin. opii | 0.30 to 1 C. c | 5 to 15 minims. |
| Vin. rhei | 4 to 8 C. c | 1 to 2 fl. drachms. |
| Zinci acet | 5 to 12 centigrams. | 1 to 2 grains. |
| Zinci bromid | 3 to 10 centigrams. | ½ to 2 grains. |
| Zinci iodid | 3 to 15 centigrams. | ½ to 3 grains. |
| Zinci oxid | 6 to 60 centigrams. | 1 to 10 grains. |
| Zinci phosphid | 5 to 10 milligrams. | $\frac{1}{10}$ to ⅙ grain. |
| Zinci sulphas emet | 1 to 2 Gm | 15 to 30 grains. |
| Zinci valerianas | 6 to 40 centigrams. | 1 to 6 grains. |

## POISONS.

### SYMPTOMS AND ANTIDOTES.

Cases of poisoning require the prompt administration of remedies, and hence, a knowledge of the usual antidotes is requisite, in order that they may be employed with effect.

For the majority of such cases, the chief reliance should be upon emetics, so that free vomiting may be induced by such articles of this class which are most speedy in their effect. Sulphate of zinc is preferred by many, and, if vomiting is present, it may be aided by diluents or a vegetable emetic. When the poisonous substance has remained for any length of time in the stomach, the use of emetics will not prove sufficient, but resort must be had to the stomach-tube and syringe. Milk, lime-water, soap, or solutions of sugar or honey will protect the stomach and intestines, while oil and other fatty matters may prove injurious. Carbonate of magnesia with tincture of opium, suspended in water, freely administered, will prove very serviceable after the vomiting has ceased, and the patient is suffering from retching and pain.

When the nature of the poison is unknown, a general antidote, consisting of equal parts of calcined magnesia, pulverized charcoal, and hydrated peroxide of iron, which are to be diffused in water, may be freely administered, and will, in the

majority of cases, prove efficient, as one or another of them is an antidote to most of the mineral poisons.

The albumen of eggs and tannic acid are also considered to be valuable antidotes. The albumen neutralizes corrosive sublimate and like salts, and the tannic acid precipitates all of the vegetable alkaloids as tannates.

ACIDS (*Mineral*).

*Symptoms.* Corrosion of parts with which the acid comes in contact, with an immediate burning pain in mouth, throat, œsophagus and stomach; vomiting of liquid impregnated with mucus and blood. Death occurs from inflammation, or from asphyxia.

*Antidotes.* Chalk; magnesia; solution of carbonate of soda; emollient drinks; fixed oils and fatty matter; plaster off wall, in emergency.

ACONITE.

*Symptoms.* Numbness and tingling of the mouth and throat, followed by vomiting and purging; giddiness; feeble pulse; dilated pupil; oppressive breathing; paralysis. Death occurs from syncope or apnœa.

*Antidotes.* Emetics; stimulants, external and internal, such as sulphate of zinc, tannic acid, animal charcoal, atropine, belladonna.

ALKALIES (*See Potash*).

ANTIMONY (*Tartar Emetic, Butter of Antimony*).

*Symptoms.* A burning pain in stomach and bowels; vomiting; purging; cold perspiration; great thirst; cramps; great debility, and death.

*Antidotes.* Vegetable acids, such as tannic acid, catechu, nutgalls, white oak bark, kino, cinchona.

ARSENIC.

*Symptoms.* Faintness and nausea, with burning pain in the epigastrium; vomiting; purging, or diarrhœa; thirst; constriction in the throat; feeble action of the heart, with a quick and weak pulse; painful and hurried respiration; cold and clammy skin. Death occurs from collapse, and sometimes with convulsions.

*Antidotes.* Moist peroxide of iron (obtained from perchloride of iron and calcined magnesia); animal charcoal; ammonia; lime water; stomach pump; artificial respiration; cold affusion; emetics; milk; raw eggs.

ARGENTI NITRAS (*Nitrate of Silver*).

*Symptoms.* Corrosion of parts; sometimes nausea and vomiting and convulsions; paralysis.

*Antidotes.* Solution of common salt in demulcent drinks; albumen.

ATROPINE.

*Symptoms.* Insatiable thirst, with dryness of mouth and throat; nausea; giddiness; palpitation of heart; intensely dilated pupil; coma, and death.

*Antidotes.* Emetics; sulphate of copper (gr. x); cold to head; ammonia, externally and internally; opium; animal charcoal; calabar bean; stimulants; subcutaneous injection of morphia.

BELLADONNA.

*Symptoms.* Same as those of atropia.

*Antidotes.* Same as for atropia.

CANNABIS INDICA (*Indian Hemp*).

*Symptoms.* Temporary insanity, as shown by a singular gait, a constant rubbing of hands, and other strange actions; a peculiar and cunning appearance of the eyes; great hunger.

*Antidotes.* Hot brandy and water; vegetable acids, such as lemon-juice, vinegar, etc.; blisters to nape of neck; indulgence in sleep.

CANTHARIDES.

*Symptoms.* A burning pain in stomach; vomiting and purging; blood-stained urine; pain in loins; strangury; priapism; convulsions; death.

*Antidotes.* Emetics; emollient or mucilaginous drinks; opiates by mouth and rectum; venesection, if necessary.

CARBOLIC ACID.

*Symptoms.* When taken internally, it causes pain in the stomach; a whitened and shriveled appearance of the mucous

membrane of the lips, mouth and throat; sometimes vomiting; contracted pupils; stertorous breathing; coma, and death within a period of from five to ten minutes to eight or ten hours, according to the quantity of the acid swallowed.

*Antidotes.* Olive oil; castor oil; lime water; saccharate of lime; precipitated carbonate of lime; albuminous and mucilaginous substances.

### CHLORINE WATER.

*Symptoms.* Irritation of air passages; burning pain in the throat and stomach; vomiting of bloody mucus.

*Antidotes.* Albumen; white of egg; milk; flour.

### CHLORAL.

*Symptoms.* Excitement; delirium; flushed face; cramps in limbs; eyes closed; profound unconsciousness; stertorous breathing; increasing feebleness; lividity of countenance; loss of pulse; pallor; coldness of extremities; muscular relaxation; death from cardiac syncope.

*Antidotes.* Nitrite of amyl, when the poison has been taken in large quantity; strychnia, when the action of the poison is slow and culminative. According to some authorities, picrotine, $\frac{1}{20}$ gr., sufficient for 30 grs. of chloral; coffee.

### CHLOROFORM.

*Symptoms.* Drowsiness; insensibility; stertorous, rapid breathing; weak pulse; dilatation of pupils; relaxation of muscles; coldness of surface; increasing feebleness of pulse; heart ceasing its action.

*Antidotes.* Fresh air; artificial respiration (inclining head down, tongue pulled forward), cold water dashed over face and chest; galvanism to pneumogastric and through diaphragm (one pole may be applied to nape of neck and the other to the pit of the stomach); brandy and ammonia enemata; hypodermic injection of $\frac{1}{10}$ gr. of digitaline, followed in four hours after by $\frac{1}{10}$ gr. of atropia, or hypodermic injection of 1 drachm of ether; inhalation of nitrite of amyl; tracheotomy.

CONIUM (*Hemlock*).

*Symptoms.* Thirst; dryness of throat; delirium; convulsions; coma and death resulting from paralysis of the respiratory muscles.

*Antidotes.* Emetics, followed by demulcent drinks, internal and external stimulants, as brandy; ammonia; coffee, if coma is present; tannic acid; animal charcoal.

CORROSIVE SUBLIMATE.

*Symptoms.* Heat and pain of a burning nature in mouth, and throat, and stomach; nausea; vomiting of bloody mucus; diarrhœa; dysentery; cramps; convulsions; coma and death.

*Antidotes.* Albumen; milk; white of egg (white of 1 egg to 4 grs. corrosive sublimate); flour; perchloride of tin; iron and zinc (iron filings 2 parts and zinc 1 part).

CREASOTE (*See Carbolic Acid*).

CROTON OIL.

*Symptoms.* Irritation of mucous membrane; burning pain along course of alimentary tract; excessive purging; inflammation of stomach and intestines.

*Antidotes.* Emetic of sulphate of copper, 10 grs., followed by mucilaginous fluids containing opium, to allay the pain; olive oil; opium.

SULPHATE OF COPPER.

*Symptoms.* Metallic taste; eructations; violent emesis and purging; cramps in limbs; griping pains; headache; giddiness; convulsions; coma and death, with symptoms of a disordered condition of the nervous system.

*Antidotes.* Albumen or white of egg.

DIGITALIS.

*Symptoms.* Nausea; vomiting; purging; feeble or slow and irregular pulse; dilated pupils; excessive debility; stupor; convulsions; coma and death.

*Antidotes.* Recumbent posture after the use of such emetics as sulphate of zinc; stimulants internally and externally; tannic acid; animal charcoal.

### HYDROCYANIC ACID.

*Symptoms.* Dilated pupils; spasmodic breathing; convulsions; insensibility; fixed eyes; spasmodic closure of jaws; very feeble pulse and speedy death.

*Antidotes.* Fresh air and artificial respiration, with cold affusion upon head and neck; freshly precipitated oxide of iron, with an alkaline carbonate, such as carbonate of ammonia; chlorine.

### HYOSCYAMUS.

*Symptoms.* A feeling of giddiness, followed by delirium; dilated pupils; fullness about the head; drowsiness; cold perspiration; paralysis; exhaustion; death.

*Antidotes.* Stomach pump; emetics; stimulants, external and internal; lemon juice; strong coffee.

### IODINE.

*Symptoms.* In extreme cases, violent vomiting and purging; fever and excessive thirst; palpitation of heart; cramps; small and frequent pulse; occasional dry cough; and when death ensues, it is probably due to gastro-enteritis. In excessive doses, it acts as an irritant poison, giving rise to such symptoms as restlessness; burning sensation; palpitation; violent priapism; frequent pulse; excessive thirst; extreme diarrhœa; trembling; extreme emaciation, and sometimes syncope.

*Antidotes.* Emetics and demulcent drinks; starch or flour diffused in water; albumen; milk.

### LEAD SALTS.

*Symptoms.* A dry and constricted throat; pain in stomach and bowels; colic; paralysis of extensor muscles; apoplectic symptoms.

*Antidotes.* Sulphate or phosphate of soda; Epsom salts, followed by emetics, and afterwards opium and milk; iodide of potassium.

### MORPHINE (*See Opium*).

### MERCURY.

When in the form of the perchloride (corrosive sublimate), or nitrate of mercury, see corrosive sublimate.

### NUX VOMICA.

*Symptoms.* Spasmodic twitching of muscles; violent movements of limbs; tetanic spasms; dyspnœa; death.

*Antidotes.* Enema of tobacco, ½ oz. to 20 oz. of boiling water, to be administered until spasms abate; nicotine, 1 drop, in warm sherry wine and water.

### OPIUM.

*Symptoms.* Increasing drowsiness; giddiness; stupor; insensibility; stertorous breathing; feeble pulse; contracted pupil; coma; convulsions; death.

*Antidotes.* Emetic of 10 grs. of sulphate of copper; stomach pump; stimulants, external and internal; brandy and coffee; artificial respiration; cold affusion; ammonia to nostrils; enforced exertion; galvanic shocks; belladonna; tannic acid; animal charcoal; atropine.

### OXALIC ACID.

*Symptoms.* Burning pain in throat, œsophagus and stomach; vomiting of a dark green or black fluid, composed of altered mucus and blood.

*Antidotes.* Chalk; magnesia; plaster from wall in emergency; solution of carbonate of soda; emetics; stomach pump.

### PHOSPHORUS.

*Symptoms.* Burning pain along alimentary tract; corrosion of tissues; vomiting of mucus and blood; diarrhœa.

*Antidotes.* Magnesia; turpentine; emetics and purgatives.

### POTASH AND SODA SALTS.

*Symptoms.* Sharp, burning pain of the mouth, throat, œsophagus and stomach; corrosion; vomiting of blood and mucus.

*Antidotes.* Dilute acetic acid; citric acid; lemon juice; fixed oils; demulcents.

### SILVER (*Nitrate of Silver*).

*Symptoms.* Corrosion of tissues; nausea; vomiting; convulsions; paralysis.

*Antidotes.* Chloride of sodium (common salt); albumen; white of egg.

STRAMONIUM (*See Belladonna*).

STRYCHNINE.

*Symptoms* Spasmodic action of muscles (twitching); jerking of limbs; tetanic spasms; dyspnœa; death.

*Antidotes.* Chloroform; belladonna; tincture of aconite; morphia; tobacco; chloral, in drachm doses; 8 grs. morphia antidote to 1 gr. strychnia; extract of conium.

TOBACCO.

*Symptoms.* Nausea; vomiting; violent retching.

*Antidotes.* Emetic; stimulants, both external and internal; strychnia.

ZINC SALTS.

*Symptoms.* A burning sensation in stomach; nausea; vomiting; anxious countenance; difficult breathing; small, quick pulse; cold perspiration; syncope; convulsions; death.

*Antidotes.* Carbonate of soda; emetics; warm demulcent drinks.

## THE PULSE.

The word "pulse" is derived from the Latin word *pulso*, "I strike," and denotes the striking or lifting of the finger by the distending vessel, as with each contraction of the heart blood is forced into the vessels.

The word pulse has also been applied to the appearance of a lifting up of the coverings over a distending vessel, so that this word "pulse" is applied not only to that which is felt, but to that which is seen.

There are two kinds of pulse, the arterial and the venous. The arterial is appreciated mainly by palpitation, the venous by inspection. It is the "arterial pulse" that it is necessary to study.

The "radial pulse" is the one usually selected, although the "temporal pulse" is also noted in the administration of anæsthetic agents. The pulse in other vessels must also sometimes

be observed, as in the brachial, the facial in front of the masseter muscle, the posterior tibial, the dorsalis pedis, the carotid and femoral arteries.

The "radial pulse," the one usually selected, and which, in most cases, answers all the requirements, is of moderate size, superficial, and can be readily compressed against the radius.

When the pulse is to be observed, the patient should be either sitting or lying down. The observer should place his index, middle, or ring finger lightly upon the pulse, and should then appreciate the state of the coats of the artery, and should next note the frequency, the rhythm, the tension, volume and force of the pulse; and, lastly, any peculiarities, if present. Moreover, the pulse of one side of the body should always be compared with the other.

It should also be remembered that forcible extension or flexion of the forearm will sometimes arrest the radial pulse.

In noting the pulse of children and infants, it is well to count the pulse, if possible, while they are asleep.

This can be conveniently done in the temporal artery.

In noting the pulse at the wrist, asleep or awake, there are often involuntary movements of the arm and twitching of the muscles, which render it difficult to keep the finger of the observer on the pulse. This difficulty may be overcome in a great degree by grasping the entire hand of the child, and then extending the index finger upon the pulse. It is also advisable not to take the pulse of the patient until some little time has elapsed after the appearance of the observer. In health, changes in the frequency and rhythm of the pulse are often met with.

The following is a table of the variations in the frequency of the pulse in health:—

| | |
|---|---|
| Infant asleep, at birth, | 140 |
| Infancy, | 120 |
| Child under 5 years of age, | 100 |
| Youth, | 90 |
| Male adults, | 72–80 |
| Female adults, | 80–85 |
| Old age, | 70 |

It is only in rare cases that great frequency of the pulse in health is met with. Sex has some influence. Up to the 7th year of age the frequency is about the same in both sexes, but later the female pulse is from 6 to 14 beats—average 9—greater than in the male.

Posture also affects the pulse. It is most frequent in the standing, and least in the recumbent position.

The pulse of a man is twice as much affected by change of position as that of a woman.

When the pulse is much increased in frequency, change in position has but little effect, and, for the higher numbers, entirely disappears. When the head is lower than the body, the pulse falls. The general law as to the degree of frequency of the pulse, as affected by position, is as follows:—

The frequency is directly proportioned to the amount of muscular effort required to support the body in different positions. The pulse falls in sleep, as much as ten beats. Sleeplessness increases its frequency. On awaking from sleep, there is usually a decided increase in frequency. Food increases the rate of the pulse. Mental excitement and activity of the emotions increases the frequency; mental depression is often accompanied by a decrease. Cold lowers and heat raises the rate of the pulse. Among other causes producing an increase in the frequency of the pulse in health, are spirituous and warm drinks, tobacco, diminished atmospheric pressure. Among other causes producing diminished frequency of the pulse, besides those before mentioned, are fatigue, long continued rest, debility without disease, and increased atmospheric pressure.

Occasionally the pulse is irregular in health, but when it is so, it is usually congenital. Intermittency is not infrequent in health, and it is then either congenital or may be due to terror, anxiety, grief, mental or physical fatigue, and old age. The intermittency may be only temporary, or it may become permanent; and if it becomes very frequent, may be pathological.

A pulse of 90 or more may be regarded as a pulse of

abnormal frequency in an adult. There are exceptions to this, but they are rare. If the pulse is quicker than the temperature will explain, it indicates cardiac weakness.

A pulse that day by day progressively increases, the temperature remaining the same, shows increasing cardiac weakness. In all febrile diseases, a pulse, in adults, over 120 is serious, and indicates cardiac weakness. A pulse of 130 or 140 indicates great danger; and with a pulse at 160, the patient almost always dies.

Under the age of fifteen, any disease of the lungs is almost invariably accompanied by great frequency of the pulse, so that a pulse of 120 to 140 would not be considered as so serious in significance as if it occurred in an older person.

A pulse of 120 in a strong, robust patient affected with pneumonia, indicates some form of heart disease. When pneumonia occurs in the cachectic or debilitated, the pulse is usually very frequent, often 120 to 160, and such cases usually die. In pericarditis and myocarditis, there is great frequency of the pulse, especially on any movement of the patient—130 to 160—and the change may be very sudden. In acute articular rheumatism, unaccompanied by any heart disease, a pulse of 120 or more indicates great danger. In pleuritic effusions, the pulse may be very frequent, especially when there is displacement of the heart.

## RESPIRATION AT VARIOUS AGES.

| | |
|---|---|
| At one year of age, per minute, | 35 |
| " two years of age, " " | 25 |
| " puberty, " " | 20 |
| " adult age, " " | 18 |

## THERMOMETERS.

There are three different thermometers in use—Fahrenheit's Centigrade and Reaumer's—each differing from the other with reference to the number of degrees between the freezing and boiling points of water. In Fahrenheit's, zero is placed at 32 degrees below the freezing point, while in the others zero marks the freezing point.

The boiling point in Fahrenheit's is placed at 212 degrees; in Centigrade at 100, and in Reaumer's at 80.

The degrees between the freezing and boiling points in the instruments are, therefore, respectively 180, 100 and 80.

The following diagram will explain the variance:—

| | | | | | | |
|---|---|---|---|---|---|---|
| Fahrenheit, . . . . | 0 | 32 | 77 | 122 | 167 | 212 |
| Centigrade, . . . . | 17.77 | 0 | 25 | 50 | 75 | 100 |
| Reaumer, . . . . . | 14.22 | 0 | 20 | 40 | 60 | 80 |

## TABLE OF ELEMENTARY SUBSTANCES.

| Elements. | Symbol. | Atomic Weight. | Equivalent. | Elements. | Symbol. | Atomic Weight. | Equivalent. |
|---|---|---|---|---|---|---|---|
| Aluminium. . | Al | 27 | 13.5 | Molybdenum . | Mo | 95.5 | 42.75 |
| Antimony . . | Sb | 120 | 120 | Nickel . . . | Ni | 58 | 29 |
| Arsenic . . . | As | 74.9 | 74.9 | Niobium . . | Nb | 94 | 94 |
| Barium . . . | Ba | 136.8 | 68.4 | Nitrogen[3] . . | N | 14 | 14 |
| Beryllium (Glucinum) . . | Be | 9 | 9 | Osmium . . | Os | 198.5 | 99.25 |
| | | | | Oxygen[4] . . | O | 16 | 8 |
| Bismuth . . | Bi | 210 | 210 | Palladium . . | Pd | 105.7 | 52.85 |
| Boron . . . | B | 11 | 11 | Phosphorus . | P | 31 | 31 |
| Bromine . . | Br | 79.8 | 79.8 | Platinum . . | Pt | 194.4 | 97.2 |
| Cadmium . . | Cd | 111.8 | 55.9 | Potassium . . | K | 39 | 39 |
| Cæsium . . | Cs | 132.6 | 132.6 | Rhodium . . | Rh | 104.1 | 52.05 |
| Calcium . . | Ca | 40 | 20 | Rubidium . . | Rb | 85.3 | 85.3 |
| Carbon[1] . . | C | 12 | 6 | Ruthenium . | Ru | 104.2 | 52.1 |
| Cerium . . . | Ce | 141 | 70.5 | Scandium . . | Sc | 44 | 22 |
| Chlorine[2] . . | Cl | 35.4 | 35.4 | Selenium . . | Se | 78.8 | 39.4 |
| Chromium . . | Cr | 52.4 | 26.2 | Silicon . . . | Si | 28 | 14 |
| Cobalt . . . | Co | 58.9 | 29.45 | Silver . . . | Ag | 107.7 | 107.7 |
| Copper . . . | Cu | 63.2 | 31.6 | Sodium . . . | Na | 23 | 23 |
| Didymium . . | Di | 144.6 | 72.3 | Strontium . . | Sr | 87.4 | 43.7 |
| Erbium . . . | E | 165.9 | 82.95 | Sulphur[5] . . | S | 32 | 16 |
| Fluorine . . | Fl | 19 | 19 | Tantalum . . | Ta | 182 | 182 |
| Gallium . . . | G | 68.8 | 34.4 | Tellurium . . | Te | 128 | 64 |
| Gold . . . . | Au | 196.2 | 196.2 | Thallium . . | Tl | 203.7 | 203.7 |
| Hydrogen . . | H | 1 | 1 | Thorium . . | Th | 233 | 116.5 |
| Indium . . . | In | 113.4 | 56.7 | Tin . . . . | Sn | 117.7 | 58.85 |
| Iodine . . . | I | 126.6 | 126.6 | Titanium . . | Ti | 48 | 24 |
| Iridium . . . | Ir | 192.7 | 96.35 | Tungsten . . | Tr | 183.6 | 91.8 |
| Iron . . . . | Fe | 55.9 | 27.95 | Uranium . . | U | 238.5 | 119.25 |
| Lanthanum . | La | 138.5 | 138.5 | Vanadium . . | V | 51.3 | 51.3 |
| Lead . . . | Pb | 206.5 | 103.25 | Ytterbium . . | Yb | 172.7 | 172.7 |
| Lithium . . . | Li | 7 | 7 | Yttrium . . . | Y | 89.8 | 89.8 |
| Magnesium . | Mg | 24 | 12 | Zinc . . . . | Zn | 64.9 | 32.45 |
| Manganese . | Mn | 54 | 27 | Zirconium . . | Zr | 90 | 45 |
| Mercury . . | Hg | 199.7 | 99.85 | | | | |

[1] Carbon: 11.9736. [2] Chlorine: 35.370. [3] Nitrogen: 14.021. [4] Oxygen: 15.9633.
[5] Sulphur: 31.984.

## TABLE OF THE SOLUBILITY OF CHEMICALS IN WATER AND ALCOHOL.

Abbreviations: s. = soluble; ins. = insoluble; sp. = sparingly; v. = very; alm. = almost; dec. = decomposed.

| CHEMICALS. | WATER. | | ALCOHOL. | |
|---|---|---|---|---|
| | At 15° C. (50° F.) | Boiling. | At 15° C. (50° F.) | Boiling. |
| One part is soluble in: | Parts. | Parts. | Parts. | Parts. |
| Acidum arseniosum | 30.80 | 15 | sp. | sp. |
| Acidum benzoicum | 500 | 15 | 3 | 1 |
| Acidum boricum | 25 | 3 | 15 | 5 |
| Acidum carbolicum | 20 | ... | v. s. | v. s. |
| Acidum chromicum | v. s. | v. s. | dec. | dec. |
| Acidum citricum | 0.75 | 0.5 | 1 | 0.5 |
| Acidum gallicum | 100 | 3 | 4.5 | 1 |
| Acidum salicylicum | 450 | 14 | 2.5 | v. s. |
| Acidum tannicum | 6 | v. s. | 0.6 | v. s. |
| Acidum tartaricum | 0.7 | 0.5 | 2.5 | 0.2 |
| Alumen | 10.5 | ins. | 0.3 | ins. |
| Alumen exsiccatum | 20 | ins. | 0.7 | ins. |
| Ammonii carbonas | 4 | dec. | dec. | dec. |
| Ammonii nitras | 0.5 | v. s. | 20 | 3 |
| Ammonii valerianas | v. s. | v. s. | v. s. | v. s. |
| Antimonii et potassii tartras | 17 | 3 | ins. | ins. |
| Argenti cyanidum | ins. | ins. | ins. | ins. |
| Argenti iodidum | ins. | ins. | ins. | ins. |
| Argenti nitras | 0.8 | 0.1 | 26 | 5 |
| Argenti nitras fusus | 0 6 | 0.5 | 25 | 5 |
| Argenti oxidum | v. sp. | v. sp. | ins. | ins. |
| Atropina | 600 | 35 | v. s. | v. s. |
| Atropinæ sulphas | 0.4 | v. s. | 6.5 | v. s. |
| Bismuthi subnitras | ins. | ins. | ins. | ins. |
| Bromum | 33 | ... | dec. | dec. |
| Calcii bromidum | 0.7 | v. s. | 1 | v. s. |
| Calcii carbonas præcipitatus | ins. | ins. | ins. | ins. |
| Calcii chloridum | 1.5 | v. s. | 8 | 1.5 |
| Calcii hypophosphis | 6.8 | 6 | ins. | ins. |
| Calcii phosphas præcipitatus | ins. | ins. | ins. | ins. |
| Calx | 750 | 1300 | ins. | ins. |
| Camphora monobromata | alm. ins. | alm. ins. | v. s. | v. s. |
| Chloral | v. s. | v. s. | v. s. | v. s. |
| Cinchonidinæ sulphas | 100 | 4 | 71 | 12 |
| Cinchonina | alm. ins. | alm. ins. | 110 | 28 |
| Cinchoninæ sulphas | 70 | 14 | 6 | 1.5 |
| Codeina | 80 | 17 | v. s. | v. s. |
| Creta præparata | ins. | ins. | ins. | ins. |
| Cupri acetas | 15 | 5 | 135 | 14 |
| Cupri sulphas | 2.6 | 0.5 | ins. | ins. |
| Ferri chloridum | v. s. | v. s. | v. s. | v. s. |
| Ferri citras | s. | v. s. | ins. | ins. |

TABLE OF THE SOLUBILITY OF CHEMICALS IN WATER AND ALCOHOL.
(CONTINUED.)

| CHEMICALS. | WATER. | | ALCOHOL. | |
|---|---|---|---|---|
| | At 15° C. (50° F.) | Boiling. | At 15° C. (50° F.) | Boiling. |
| One part is soluble in: | Parts. | Parts. | Parts. | Parts. |
| Ferri lactas | 40 | 12 | alm. ins. | alm. ins. |
| Ferri sulphas | 1.8 | 0.3 | ins. | ins. |
| Ferri valerianas | ins. | dec. | v. s. | v. s. |
| Hydrargyri chloridum corrosivum | 16 | 2 | 3 | 1.2 |
| Hydrargyri chloridum mite | ins. | ins. | ins. | ins. |
| Hydrargyri cyanidum | 12.8 | 3 | 15 | 6 |
| Hydrargyri iodidum rubrum | alm. ins. | alm. ins. | 130 | 15 |
| Hydrargyri iodidum viride | alm. ins. | alm. ins. | ins. | ins. |
| Hydrargyri oxidum flavum | ins. | ins. | ins. | ins. |
| Hydrargyri oxidum rubrum | ins. | ins. | ins. | ins. |
| Hydrargyrum ammoniatum | ins. | ins. | ins. | ins. |
| Hyoscyaminæ sulphas | v. s. | v. s. | v. s. | v. s. |
| Iodoformum | ins. | ins. | 80 | 15 |
| Iodum | sp. | ... | 11 | ... |
| Magnesia | alm. ins. | alm. ins. | ins. | ins. |
| Magnesii carbonas | alm. ins. | alm. ins. | ins. | ins. |
| Magnesii sulphas | 0.8 | 0.15 | ins. | ins. |
| Magnesii sulphis | 20 | 19 | ins. | ins. |
| Mangani oxidum nigrum | ins. | ins. | ins. | ins. |
| Mangani sulphas | 0.7 | 0.8 | ins. | ins. |
| Morphina | v. sp. | 500 | 100 | 36 |
| Morphinæ acetas | 12 | 1.5 | 68 | 14 |
| Morphinæ hydrochloras | 24 | 0.5 | 63 | 31 |
| Morphinæ sulphas | 24 | 0.75 | 702 | 144 |
| Phosphorus | ins. | ins. | v. sp. | v. sp. |
| Piperina | alm. ins. | alm. ins. | 30 | 1 |
| Plumbi acetas | 1.8 | 0.5 | 8 | 1 |
| Plumbi carbonas | ins. | ins. | ins. | ins. |
| Plumbi iodidum | 2000 | 200 | v. sp. | v. sp. |
| Plumbi nitras | 2 | 0.8 | alm. ins. | alm. ins. |
| Plumbi oxidum | ins. | ins. | ins. | ins. |
| Potassa | 0.5 | v. s. | 2 | v. s. |
| Potassii acetas | 0.4 | v. s. | 2.5 | v. s. |
| Potassii bicarbonas | 3.2 | dec. | alm. ins. | alm. ins. |
| Potassii bichromas | 10 | 1.5 | ins. | ins. |
| Potassii bitartras | 210 | 15 | v. sp. | v. sp. |
| Potassii bromidum | 1.6 | 1 | 200 | 16 |
| Potassii carbonas | 1 | 0.7 | ins. | ins. |
| Potassii chloras | 16.5 | 2 | v. sp. | v. sp. |
| Potassii citras | 0.6 | v. s. | v. sp. | v. sp. |
| Potassii cyanidum | 2 | 1 | sp. | sp. |
| Potassii ferrocyanidum | 4 | 2 | ins. | ins. |
| Potassii hypophosphis | 0.6 | 0.3 | 7.3 | 3.6 |
| Potassii iodidum | 0.8 | 0.5 | 18 | 6 |
| Potassii nitras | 4 | 0.4 | alm. ins. | alm. ins. |

TABLE OF THE SOLUBILITY OF CHEMICALS IN WATER AND ALCOHOL.
(CONTINUED.)

| CHEMICALS. | WATER. | | ALCOHOL. | |
|---|---|---|---|---|
| | At 15° C. (50° F.) | Boiling. | At 15° C. (50° F.) | Boiling. |
| One part is soluble in: | Parts. | Parts. | Parts. | Parts. |
| Potassii permanganas | 20 | 3 | dec. | dec. |
| Potassii sulphas | 9 | 4 | ins. | ins. |
| Potassii tartras | 0.7 | 0.5 | alm. ins. | alm. ins. |
| Quinidinæ sulphas | 100 | 7 | 8 | v. s. |
| Quinina | 1600 | 700 | 6 | 2 |
| Quininæ bisulphas | 10 | v. s. | 32 | v. s. |
| Quininæ hydrochloras | 34 | 1 | 3 | v. s. |
| Quininæ sulphas | 740 | 30 | 65 | 3 |
| Quininæ valerianas | 100 | 40 | 5 | 1 |
| Saccharum | 0.5 | 0.2 | 175 | 28 |
| Saccharum lactis | 7 | 1 | ins. | ins. |
| Salicinum | 28 | 0.7 | 30 | 2 |
| Soda | 1.7 | 0.8 | v. s. | v. s. |
| Sodii acetas | 3 | 1 | 30 | 2 |
| Sodii bicarbonas | 12 | dec. | ins. | ins. |
| Sodii boras | 16 | 0.5 | ins. | ins. |
| Sodii carbonas | 1.6 | 0.25 | ins. | ins. |
| Sodii chloras | 1.1 | 0.5 | 40 | 43 |
| Sodii chloridum | 2.8 | 2.5 | alm. ins. | alm. ins. |
| Sodii hypophosphis | 1 | 0.12 | 30 | 1 |
| Sodii hyposulphis | 1.5 | 0.5 | ins. | ins. |
| Sodii iodidum | 0.6 | 0.3 | 1.8 | 1.4 |
| Sodii nitras | 1.3 | 0.6 | sp. | 40 |
| Sodii sulphas | 2.8 | 0.4 | ins. | ins. |
| Sodii sulphis | 4 | 0.9 | sp. | sp. |
| Strychnina | 6700 | 25000 | 110 | 12 |
| Strychninæ sulphas | 10 | 2 | 60 | 2 |
| Sulphur lotum | ins. | ins. | ins. | ins. |
| Sulphur præcipitatum | ins. | ins. | ins. | ins. |
| Sulphur sublimatum | ins. | ins. | ins. | ins. |
| Thymol | 1200 | 900 | 1 | v. s. |
| Veratrina | v. sp. | v. sp. | 3 | v. s. |
| Zinci acetas | 3 | 1.5 | 30 | 3 |
| Zinci carbonas præcipitatus | ins. | ins. | ins. | ins. |
| Zinci chloridum | v. s. | v. s. | v. s. | v. s. |
| Zinci iodidum | v. s. | v. s. | v. s. | v. s. |
| Zinci oxidum | ins. | ins. | ins. | ins. |
| Zinci phosphidum | ins. | ins. | ins. | ins. |
| Zinci sulphas | 0.6 | 0.3 | ins. | ins. |
| Zinci valerianas | 100 | ... | 40 | ... |

## CLASSIFICATION OF MEDICINAL SUBSTANCES.

In order to impress the memory and facilitate investigation, it is necessary that medicinal substances should be classified according to their similarity of action on the animal economy, as follows :—

1. NEUROTICS, or those which have a special action on and modify the functions of the nervous system. To this group belong: Narcotics, Anæsthetics, Antispasmodics, Tonics, Astringents, Stimulants, Sedatives, Spinants.

2. ECCRITICS, or those which have a special action on the secretions. To this group belong: Emetics, Cathartics, Diaphoretics, Diuretics, Blennorrhetics, Emmenagogues.

3. HÆMETICS, or those which modify the blood. To this group belong: Hæmatinics, Alteratives, Antacids.

4. TOPICAL REMEDIES. To this group belong: Irritants, Demulcents, Coloring Agents, Anthelmintics.

## DEFINITIONS OF THE VARIOUS CLASSES OF REMEDIAL AGENTS.

### NARCOTICS.

Narcotics are medicinal substances which affect the cerebral and spinal functions by impairing or destroying nervous action, having first a stimulant effect, to which their therapeutic efficacy is in a great degree due. Narcotics allay cerebral or spinal irritability, relieve muscular spasm, and also pain, and induce sleep. When administered to relieve pain, they are termed *anodynes;* to induce sleep they are termed *hypnotics* or *soporifics.*

Narcotics fulfill two indications, namely: Exciting and depressing the nervous energy. For the first, it is necessary to begin with small doses and repeat them frequently; for the second, a full dose must be given and not repeated for a con-

siderable time. On account of the system becoming very soon habituated to the action of narcotics, when it is necessary to resort to their use for any length of time, the amount must be constantly increased, in order to maintain the same impression. The difference between the susceptibility to their action when the body is in a morbid or a healthy condition, should not be overlooked.

Under narcotics are classed such agents as *opium* and its different preparations, chloral, lactucarium, belladonna, stramonium, hyoscyamus, tobacco, lobelia, conium, aconite, cannabis indica, humulus, camphor, hydrocyanic acid, etc., etc.

### ANÆSTHETICS.

Anæsthetics are medicinal agents which diminish sensibility and relieve pain. They are generally in the form of vapors or gases, applied by inhalation, and possess the power of temporarily suspending the general sensibility, being commonly employed for the prevention of pain during surgical operations. They are divided into general and local anæsthetics.

General anæsthetics are agents capable of producing complete insensibility throughout the entire system. Included in this class are such agents as ether, chloroform, nitrous oxide gas, bromide of ethyl, bichloride of methylene, tetrachloride of carbon, dichloride of ethidene, etc., etc.

Local anæsthetics are agents whose action is limited to a certain part or organ, when topically applied, paralyzing the nerves of the part, and temporarily destroying the sensibility. Included in this class are such agents as absolute ether, rhigolene, aconite, pyrethrum, atropine, etc., etc.

### ANTISPASMODICS.

Antispasmodics are medicinal agents which allay irregular muscular contraction or spasm, and compose the irregular actions of the nervous system, without any special or decided effect on the brain. They are employed in many varieties of mental disturbance, insanity, wakefulness, hypochondriasis, convulsions from teething, spasm from general debility, in which latter case an aromatic stimulant of the circulation and a

permanent tonic prove beneficial. In hysteria, dependent upon idiopathic or primary nervous irritation, the use of antispasmodics is indicated. Included in this class are such agents as asafœtida, musk, camphor, valerian, galbanum, ammoniac, castor, compound spirit of ether (Hoffman's anodyne), etc., etc.

## TONICS.

Tonics are medicinal agents which impart strength to the system, producing a gradual and permanent increase of nervous vigor, without preternatural excitement. They stimulate also in a secondary manner, by gradually increasing the force of the circulation, and restoring the digestive and secretory functions to a more healthy state, differing, however, from stimulants, in the more permanent character of their effects.

Certain agents of this class, when administered in large doses, act as antiperiodics in intermittent diseases. Benefit also results in the use of tonics by alternating them. They are divided into *vegetable* and *mineral* tonics, the former possessing a bitter extractive principle, and the latter uniting astringent with tonic properties, and, in the case of preparations of iron, increasing the red coloring matter of the blood. Such agents as gentian, quassia, columbo, wild cherry, serpentaria, cinchona and its alkaloid quinine, salix, pepsin, are examples of vegetable tonics; and the preparations of iron, preparations of copper, preparations of zinc, and such agents as subnitrate of bismuth, sulphuric, nitric, muriatic and oxalic acids, are examples of the mineral tonics.

## ASTRINGENTS.

Astringents are medicinal agents which produce contraction of the tissues, having a corrugating power, either directly exerted on a part, or extended by sympathetic action, and thus removing morbid affections arising from a state of relaxation, such as inflammation of superficial parts, hemorrhage and excessive discharges from mucous membranes. This class of remedies is important in dental practice, owing to their great efficacy as antiphlogistics. Astringents are divided into *vegetable* and *mineral*, the former owing their peculiar property of

astringency to the presence of tannic acid, while the latter possess a more decided astringency, and exert a sedative action on the vascular system. In the treatment of affections of the mucous membrane, such as *stomatitis*, the object is to arrest the inflammatory action, which is accomplished by the power of the astringent remedies employed locally to increase the tonicity of the tissue, and to diminish the calibre of the vessels supplying the part with blood, thus diminishing the quantity required for the production of the morbid action. Besides diminishing the current of the blood to the inflamed part, astringents also exert an influence on the pores or ducts through which the discharge is poured out, by diminishing their calibre also. Astringents also exert an influence on morbidly relaxed tissues, when such a condition results as the sequelæ of disease, especially in lymphatic temperaments, where flabbiness of the soft tissues is characteristic.

Care, however, is necessary in the use of astringents, for when long or immoderately used they may act as direct irritants, inducing inflammation followed by ulceration and sloughing. They are contra-indicated for the arrest of evacuations that are designed by nature to relieve a plethoric state of the system, unless such evacuations exist to an alarming extent. This class of remedies can be readily detected by the taste, as they convey a sense of roughness to the palate which cannot be mistaken, and which is more marked in some substances than in others. Such agents as tannic acid, gallic acid, nut-gall, matico, kino, catechu, rhatany, white oak bark, creasote, salicylic acid, are examples of the vegetable astringents; while the preparations of iron and lead, alum, sulphuric and nitric acids are examples of the mineral astringents. (See *Styptics*.)

### STIMULANTS.

Stimulants, also known as *excitants* and *hypersthenics*, are medicinal substances capable of exciting a temporary and rapid exaltation of the organic actions, the excitation thus produced being extended or not to the rest of the system. Although the stomach is the organ generally selected in medical

practice to be the first impressed by stimulants, on account of the extensive sympathy which exists between it and the rest of the system, in dental practice these agents are topically applied to the mucous membrane of the mouth as counter-irritants and vesicants. The influence of stimulants is most apparent in conditions of morbid depression, whereas in health they soon induce depression. They possess the power of arousing the energies of the nervous system, and hence are beneficial in many nervous disorders, especially those of a spasmodic nature. When applied to the gastro-intestinal canal they promote digestion as *stomachics*, and when administered to dispel flatulence they are known as *carminatives*. When internally administered, it is for the most part advisable to begin with small doses, and increase them as circumstances may require. In some cases, however, it is necessary to give them freely from the first. It is often requisite to change the stimulating substance and also the part of the body to which it is applied; when the stomach fails, the rectum and skin may be acted upon beneficially. Topically applied, stimulants irritate and inflame the parts with which they come in contact, and are then known as *irritants*.

The most powerful and rapid stimulants are known as *diffusible*, while those of a vegetable nature, containing a volatile oil, are termed *aromatic*. Among the class of diffusible stimulants are such agents as alcohol, preparations of ammonia, arnica, phosphorus, etc., etc. Among the class of aromatic stimulants are capsicum, cinnamon, black pepper, mace, cloves, pimento, oil of turpentine, ginger, cardamom, calamus, gaultheria, peppermint, origanum, etc., etc.

## SEDATIVES.

Sedatives are medicinal substances employed to diminish the frequency of the action of the circulation, their therapeutic influence being due, it is thought, to a stimulant character. They reduce vascular excitement, and while relieving irritability and irregularity of the heart's action, their first effect is to restore its tone and force when it is in a morbidly depressed

condition. Substances known as *refrigerants*, which possess the power of diminishing febrile heat, allaying thirst, restoring the secretions, and which comprise almost all of the neutral alkaline salts, are also included with sedatives. Among the class known as sedatives are digitalis, American hellebore (veratrum viride), white hellebore (veratrum album), yellow jasmine (gelsemium), tartar emetic, nitrate of potassium, etc., etc. Among the class known as refrigerants are borate of soda, citrate of potassium, acetate of ammonia, spirit nitrous ether, and vegetable acids.

### SPINANTS.

Spinants or spastics are medicinal substances employed to excite muscular contraction. Vegetable spinants containing the alkaloids strychnia and brucia and employed therapeutically in cases of torpid and paralytic conditions of the muscular system, are the most important of this class; also ergot, which is employed to excite muscular contraction of the uterus. Among the class of spinants are such agents as nux vomica, and its alkaloid strychnine, ignatia, cotton-root bark, ergot.

### EMETICS.

Emetics are medicinal substances which excite vomiting, their action being independent of any effect arising from the quantity of the agent introduced into the stomach.

While the action of an emetic is local as regards the stomach, it extends to almost every organ of the body, and in order that a substance of this kind shall produce its effect upon the stomach, it must first make an impression upon the cerebro-spinal axis. Within fifteen or twenty minutes after an emetic is administered there is experienced a feeling of distress, relaxation and faintness, with a cool, moist skin and small, feeble and irregular pulse, such symptoms increasing until emesis occurs; during which the face becomes flushed, the pulse full and frequent, with an increase in the temperature of the body. When the act of vomiting is over, the skin again becomes moist, the pulse soft and feeble, and a languid and drowsy feeling is experienced. Whatever may be the apparent necessity for evacu-

ating the stomach, all the circumstances of the case must be considered, and, especially if there be much arterial excitement with determination to the head, blood-letting should sometimes be premised.

When the full dose of an emetic is requisite, as in cases of poisoning, the object is to evacuate the contents of the stomach as speedily as possible; but in other cases it is better to administer the emetic substance in divided doses, frequently repeated, until the desired effect is produced.

In cases of torpor or congestion, it is sometimes necessary to arouse the system by retching or vomiting, which may be done by administering the emetic with only a small quantity of fluid; but when the object is to empty the stomach and duodenum merely, free draughts of tepid water or weak chamomile tea may be given as soon as nausea occurs. When the excitability of the stomach is greatly diminished by a narcotic, as in cases of poisoning, it is necessary to assist the emetic by the addition of some excitant. Vinegar, mustard, or ammonia answer as excitants, when such an effect is caused by opium; but the stomach tube is the best resource.

There are some few cases where emetics cannot be employed with safety, as in congestion of the brain, a great determination of blood to the head depending upon constitutional causes, pregnancy, hernia, active hemorrhage from the lungs and uterus, acute gastritis, etc., etc.; and if emetics are allowable in such diseases or conditions, it is in nauseating doses only. When they are used merely to excite nausea, they are termed *nauseants*.

Emetics, by frequent use, are prone to cause an increased susceptibility of the stomach to their action; hence, persons of delicate habits should use them cautiously.

Therapeutically, emetics are employed to evacuate the stomach in cases of poisoning, undigested food, etc.; to expel foreign substances from the throat or œsophagus; to excite nausea, in order to depress the vascular and muscular systems; to relieve spasm; to promote secretion and excretion; and to make decided impressions in the forming stages of certain fevers and delirium tremens.

To relieve excessive vomiting, resulting from the use of emetics, ice broken in small pieces and swallowed; lime water and milk (a teaspoonful of each, mixed cold, and given at intervals of 15 or 20 minutes); a drop of creasote in a wine-glass of cold water (a teaspoonful given every 15 or 20 minutes); ½ drop of diluted hydrocyanic acid in syrup and water, or in syrup of wild cherry bark (given every 15 minutes); or infusion of camphor (made with boiling water and given cold, a teaspoonful frequently repeated); brandy and water; clove or green tea; an anodyne injection; counter irritation to the stomach (as a mustard plaster, or hot fomentation of brandy and clove or spice plaster).

Among the class of vegetable emetics are ipecacuanha, sanguinaria, mustard, lobelia, tobacco, squill; and such mineral emetics as sulphate of zinc, sulphate of copper, tartar emetic, alum, common salt, turpeth mineral.

## CATHARTICS.

Cathartics or purgatives are medicinal agents which evacuate the bowels, and are capable of fulfilling three different indications: 1. Simply to evacuate the bowels. 2. To excite an increased discharge from the mucous coat of the intestines, and 3. To stimulate the neighboring viscera and cause them to secrete a greater quantity of their peculiar fluids. When they produce watery discharges by stimulating the mucous follicles and exhalants, they are termed *hydragogues*. When given in overdoses they are so powerful as to produce violent vomiting and purging, pain in the abdomen, cold extremities and a sinking pulse. Several different cathartics are usually combined in one formula, when it is desired to produce all of the indications above referred to. Some agents of this class produce their effect by absorbing the acid generated in the alimentary canal, thus becoming converted into a purgative salt, as magnesia, for example. Others expend their principal force upon the rectum and large intestines, and for this reason are advantageously employed in affections of the lower bowels, and the uterus and its appendages, such as aloes, for example.

Cathartics should always be given on an empty stomach. If administered immediately after a full meal, they arrest the digestive process, are liable to cause nausea, if not vomiting, and do not evacuate the bowels with the same certainty or effect.

When simple costiveness is to be removed, the cathartic may be administered in the evening, and, if not sufficient, the dose can be repeated in the morning and at regular intervals through the day, until the effect is produced.

In administering cathartics, the excitement is to be repeated till the requisite action is induced, yet not sufficient to prove an irritant. But in the treatment of many diseases, it is preferable to purge through the day, in order that the sleep may not be disturbed at night. The operation of cathartics may be very much accelerated by the free use of diluent drinks, such as gruel, barley water, etc., etc. By combining these remedies, the action of many of them is modified and controlled; and some of the more powerful may be made to operate mildly and certainly by uniting small quantities of several of them in the same dose.

The addition of an emetic substance, such as ipecachuana, or tartar emetic, gives activity to the combination, while it modifies the harshness of the powerful cathartics.

The operation of a cathartic may often be promoted by judicious venesection, and if there is spasm of the intestines, opium may be advantageously added to the cathartic.

Cathartics act not only upon the bowels, but upon distant parts, as every portion of the organism is capable of being impressed by them. Cathartics are divided, according to the intensity of their operation, into *laxatives*, *purgatives* and *drastics*, to which may also be added *enemata*. Laxatives gently stimulate the mucous coat of the intestines, and hence they are well adapted for cases in which the sole indication is to unload the bowels of their contents. Purgatives are more powerful in their operation; they excite a copious exhalation from the mucous lining of the intestines, and augment the peristaltic action to a greater degree. Drastics are the more powerful and violent cathartics, and produce a greater degree

of irritation in the lining membrane of the intestines, and occasionally act upon the nerves of the stomach, so as to cause nausea and sometimes vomiting. Drastics generally belong to the resino-extractive substances, and act violently, on account of being sparingly soluble and adhering to the mucous coat of the intestines.

Enemata are agents of this class which act on the lower part of the intestinal tube by direct application; they irritate the lining membrane of the rectum, and by sympathy of continuity, their influence is extended to the intestinal canal. Hence enemata may be employed with advantage when cathartics cannot be given by the mouth, as when deglutition is impracticable. What are known as *saline cathartics* are employed in the treatment of febrile and inflammatory affections, as they do not produce any excitant action on the general system. There are also *acrid cathartics*, which are not violent enough to cause inflammation. Others are known as *mercurial cathartics*. The class known as *laxatives* comprise such substances as certain articles of diet, as ripe and dried fruits, such as tamarinds, peaches, raisins, figs, prunes, also molasses, honey, cracked wheat, Indian meal and oat meal, etc., etc. Other laxatives are castor oil, manna, sulphur, purging cassia, etc., etc. *Saline cathartics* comprise such substances as magnesia, carbonate and sulphate of magnesia (Epsom salts), solution of citrate of magnesia, sulphate of sodium (Glauber's salt), sulphate of manganese, phosphate of sodium, sulphate of potassium, cream of tartar, soluble tartar, Rochelle salt. *Mild, acrid cathartics* comprise such substances as rhubarb, aloes, senna, leptandra, elder. *Drastic cathartics* comprise such substances as jalap, may apple, scammony, colocynth, gamboge, elaterium, croton oil. *Mercurial cathartics* consist of calomel, blue mass, mercury with chalk. *Enemata* consist of tepid water, flaxseed tea or other demulcent infusion; a combination of a tablespoonful each of common salt, molasses and lard or olive oil in two-thirds of a pint of warm water, to which castor oil or Epsom salt may be added to augment the cathartic effect, is a formula for the common laxative enema.

## DIAPHORETICS.

Diaphoretics, known also as *sudorifics*, are medicinal substances capable of producing perspiration, or an increase of the cutaneous discharge, which may be occasioned by the mere drinking of a large quantity of fluid, provided the temperature of the system be kept up. The determination of blood to the cutaneous vessels by a warm temperature or exercise will produce diaphoresis, and the action of nauseating agents, by relaxing the orifices of the cutaneous vessels, and also stimulants, by exciting such vessels to increased secretion, will have the same effect.

The external application of heat, friction, etc., stimulates the cutaneous capillaries and causes an increased secretion.

Diaphoresis may also be excited by medicines which enter the circulation and stimulate the cutaneous vessels by contact, such as the mercurials and sulphur; also by medicines which act on the surface sympathetically, through the medium of the stomach, as cold drinks, etc.

Diaphoresis may also be produced by increasing the general action of the vascular system, by such means as violent exercise, the warm bath, and by the use of alcohol, ammonia, guaiacum, etc.; it may also be produced by the use of agents capable of relaxing the morbidly constricted mouths of the perspiratory vessels, such as the antimonials, saline diaphoretics, and by the operation of venesection.

*Nauseating diaphoretics* are employed to produce a powerful relaxing action in inflammatory cases not complicated with gastric irritability, and for such effects the emetics ipecacuanha and the preparations of antimony are administered.

*Refrigerant diaphoretics* are employed to produce a gentle relaxing effect in allaying febrile excitement and reducing the temperature of the body.

*Stimulating diaphoretics* are employed in rheumatic and pulmonary affections, after vascular excitement has been reduced, and where the surface is cool, being contra-indicated in a high degree of inflammation. For such effects, the diffusible stimulants, aromatic substances, and such narcotics as

opium and camphor, are administered. During the administration of diaphoretics, the patient should be confined to bed, and when diaphoresis is excited, it should not be suddenly checked. Venesection is generally resorted to when there is great arterial excitement with undue heat of skin, before the attempt is made to administer diaphoretics.

Belonging to the class of diaphoretics are such agents as Dover's powder, guaiac, spirits of mindererus, nitrate of potassa, sweet spirit of nitre, etc., etc.

### DIURETICS.

Diuretics are medicinal substances which act upon the kidneys, and produce an increased flow of urine.

Remedies of this class act immediately and specially upon the kidneys, some reaching these organs by first passing through the blood, without being decomposed, while others, on the contrary, undergo changes in the first passages, the result of such changes exciting diuresis. The principal use of diuretics is to promote the absorption of dropsical effusions. They are also employed to correct nephritic disorders, accompanied with obstructed secretion in calculi of the kidneys, ureters and bladder, and, as evacuants, to reduce inflammation.

Where there is great arterial excitement, a judicious use of the lancet is recommended, prior to the administration of diuretics, the patient being kept cool, to avoid perspiration.

To insure the full effect of diuretics, diluent drinks should be freely given, and especially such as contain some diuretic substance. Included in the class of diuretics are such agents as squill, nitre, cubebs, juniper, colchicum, erigeron, cream of tartar, copaiba, podophyllum, etc., etc.

### BLENNORRHETICS.

Blennorrhetics are medicinal substances which increase the secretion of the mucous membranes, and are employed in morbid conditions of such membranes, in order to restore them to healthy action, in cases where their secretion is deficient, excessive or abnormal in quality. They are termed *expectorants* when used to stimulate the secretion of mucus from the bron-

chial or laryngeal membranes, as in bronchitis and laryngitis, and, during convalescence, in pneumonia. The oleo-resinous agents of this class are employed in chronic diarrhœa, and the diarrhœa of typhoid fever, such as oil of turpentine, for example; also in diseases of the urino-genital mucous membranes, such as gonorrhœa, gleet, leucorrhœa, incontinence of urine, cystitis, etc., etc. Included in the class of blennorrhetics are such agents as senna, cimicifuga, garlic, turpentine, squill, copaiba, cubebs, matico, buchu, myrrh, benzoin, storax, balsam of Peru, balsam of tolu, etc., etc.

### EMMENAGOGUES.

Emmenagogues are medicinal substances which promote the menstrual discharge, or restore it when entirely suppressed. The particular emmenagogue required depends upon the cause of the amenorrhœa; for example, when anemia is the cause, the preparations of iron prove most effectual; when from plethora, blood-letting and cathartics or evacuants are resorted to. Certain medicinal substances excite the pelvic circulation, and stimulate the parts in direct connection with the uterus, and thereby increase or promote the menstrual discharge.

General debility being the cause of the local affection, an active administration of tonics, in connection with the emmenagogue required, is advisable.

The most prominent of this class of emmenagogues are savine, cantharides, ergot, cotton root, Seneca snake root, guaiacum, etc., etc.

### HÆMATINICS.

Hæmatinics are medicinal substances which increase the number of blood corpuscles, or the amount of hæmatin in the blood, and hence, are administered in such diseases as are dependent on a deficiency of these elements.

This class of remedies includes the preparations of iron or chalybeates, which are capable of causing changes in the condition of the blood, and also general and local tonic effects.

## ALTERATIVES.

Alteratives are medicinal substances which are capable, when administered in small doses, of removing morbid structures and conditions, without any sensible evacuation; in other words, changing, in some inexplicable and insensible manner, certain morbid actions of the system.

Alterative remedies reëstablish the healthy functions of the animal economy in a slow but decided manner, acting on the various secreting organs, sometimes without any sensible increase of the secretions themselves. The effect of minute doses of mercury, iodine and other substances, upon the glandular apparatus, afford examples. Medicinal remedies of almost every class become alteratives by being administered in very small doses, at intervals of a few hours; and they are generally classed with stimulants and tonics, and some of them with narcotics. By their action the secretions and exhalations are increased; the exudation of plastic or coagulable lymph is diminished; the formation of false membranes checked; the textures softened; inflammatory action arrested; and morbid growths and deposits are absorbed. Phlegmonous inflammation is arrested, and visceral and glandular enlargements are dispelled. But if administered too freely, the blood may become so impoverished as to interfere with the functions of nutrition, and a marasmatic or cachectic condition be produced, the textures being softened, or even destroyed. Hence, this class of remedies should be carefully administered, and their effects be carefully observed. The chief use of alteratives is antiphlogistic or resolvent; for example, the mercurials are generally employed in acute inflammation, and the preparations of iodine and bromine in chronic inflammations.

Included in this class are the preparations of mercury, iodine, iodide of potassium, iodoform, bromine, preparations of arsenic, phosphate and hypophosphite of lime, chlorate of potassium, permanganate of potassium, chlorine water, chlorinated lime, etc., etc.

## ANTACIDS.

Antacids are medicinal substances, capable of neutralizing acidity of the blood, the secretions, etc., by combining with the acid and counteracting it.

The alkalies, alkaline earths and their carbonates are the substances included in this class, and the former are more energetic in their action than the alkaline earths, such as magnesia. The carbonates of these earths have little or no chemical influence upon the tissues.

This class of remedies, in the form of alkaline preparations, are administered internally as antacids in cases where an unusual quantity of acid is generated in the stomach—a common symptom of dyspepsia, which is indicated by acid eructations, violent heartburn and marked effervescence when a carbonated alkali is taken; the acid in the stomach laying hold of the alkaline base, and resulting in a large quantity of carbonic acid being driven off.

Alkalies are also employed to relieve irritability of the stomach and check vomiting; also as *antidotes* in cases of poisoning from acids; also as *antilithics*, to neutralize lithic acid when it is separated in unusual quantity by the urinary secretion; also as *lithontriptics*, or solvents of calculi, more particularly lithates; also employed in cases of acute rheumatism and gout, to neutralize the excess of acid in the blood; also in diabetes mellitus, and to relieve irritability of the urinary organs, cutaneous irritation, itching of the anus, especially when such conditions are dependent on an excess of acid in the system; and also as antiplastics and resolvents in inflammation, and as diuretics. As a general rule, the administration of antacids should be preceded by an emetic or cathartic, and in some cases both.

When a permanent effect is desired, antacids are usually combined with tonics and aromatics, and occasionally with narcotics; for when given alone the relief afforded is but transient. To prevent an irritant and purgative action on the bowels, and also to facilitate their absorption, antacid preparations are administered in a state of large dilution.

In dental practice antacids are also employed for correcting acidity of the fluids of the mouth, often a result of acid eructations from the stomach. The class of antacids comprise the preparations of potassium, sodium, lithium, ammonium, magnesium and calcium. The antacids employed in dental practice are principally precipitated chalk, lime water, carbonate of soda, etc.

## IRRITANTS.

The medicinal substances recognized as irritants are subdivided into *rubefacients, epispastics, suppurants and escharotics.*

RUBEFACIENTS are agents employed to redden the surface by exciting the action of the capillaries, and occasioning an afflux of vascular and nervous power to the part with which they come in contact; hence pain is a usual consequence of their employment.

They are used for the same purposes as blisters, and are often a good substitute for them; for example, in low degrees of inflammation, as local anodynes, as general stimulants; their efficacy as such depending upon their action on the capillary circulation, and also on the pain they occasion. They are especially serviceable in the coma and asphyxia resulting from poisons and drowning, but in cases of cerebral oppression are inferior to blisters. Rubefacients are used until redness and pain occur, and their persistent application will cause vesication, and even gangrene.

In the class of rubefacients are included mustard, capsicum, oil of turpentine, ammonia liniment, Burgundy pitch, Canada pitch, ginger, black pepper, garlic, and spice plaster.

EPISPASTICS, also called *vesicants* and *blisters*, are medicinal agents capable of producing, when applied to the skin, inflammation followed by an effusion of serum beneath the cuticle. As a general rule, blisters should remain on the surface of the skin six or eight hours in order to insure their full effect. When the skin is very delicate, a shorter application will answer every purpose; and in the case of children it is seldom necessary for them to remain longer than three or four hours. When applied to the scalp, twelve hours are generally re-

quired. After removing a blister, the usual dressing is some non-irritating ointment, such as simple cerate. In acute diseases, blistering ought never to precede such means as have a tendency to reduce inflammatory action, and the application should be as near the affected part as possible.

Covering blisters with fine gauze renders them much less irritating, and does not retard their operation.

If a blister is applied long enough to redden the skin, a simple poultice will complete the vesication; and in the case of children this method should always be pursued. When it is necessary to keep the blister open, weak epispastic or savin ointment will prove sufficient. When the circulation is languid in the extremities, they seldom act efficiently, and may cause gangrene by exhausting what vitality remains. When strangury is produced, the blister must be removed after three or four hours, and the part bathed with olive oil, or a poultice applied, and diluent drinks used; an opium suppository or injection will prove serviceable. Epispastics are employed as local stimulants in the treatment of inflammation; to create a healthy inflammatory action, as in various cutaneous eruptions; to relieve pain; to destroy morbid associations by causing a powerful impression; to stimulate the absorbing or secreting vessels of parts in the neighborhood of the affected part; to stimulate generally; to relieve threatened gangrene and paralysis; to produce local depletion as evacuants, and to prepare a surface for the endermic application of medicines.

The class of epispastics include such agents as cantharides, cantharidal collodion, water of ammonia, etc., etc.

SUPPURANTS are medicinal agents, which, when rubbed on the skin, cause rubefaction, accompanied by a pustular eruption; their beneficial effects being due to the counter-irritation set up. The agents of this class are generally employed in subacute chronic laryngeal and bronchial affections, diseases of the joints, etc., etc.

Included as suppurants are croton oil, antimonial ointments, etc.

ESCHAROTICS, called also *Cauterants* or *Caustics*, are medici-

nal agents capable of destroying the structure and vitality of the parts with which they come in contact, producing an eschar or slough, which is followed by inflammation and suppuration of the neighboring tissues to such a degree that the slough separates from the living parts. The mode of action of an escharotic is as follows: After being applied to the skin, so as to chemically disorganize it, or destroy its vitality, a new action is set up in the vessels beneath the slough, so as to cause it to be thrown off. The excavation resulting is then kept open by inserting some irritant, which maintains a copious secretion of pus from the ulcerated surface. Escharotics are divided into *Actual* and *Potential;* the actual being fire itself, while the potential are substances which destroy the living solids, either by excessive stimulation, or by producing a chemical decomposition.

Iron heated to a white heat and the *moxa* (cones or cylinders of inflammable substance) represent the actual cautery; and caustic potash, nitrate of silver, burnt alum, chloride of zinc, chromic, sulphuric and nitric acids, and the nerve or arsenical paste employed in dental practice, represent the potential cautery. A sub-class is composed of what are known as ISSUES and SETONS: the *blister-issue*, where the skin is removed by a blister, and the discharge promoted by means of stimulating applications, as the cantharidal ointment, for example; also, the *pea-issue*, where an incision made by the lancet is kept open by means of a pea, bean or piece of orris root. The *Seton* is prepared as follows: A seton needle, to which is attached a skein of silk, is passed completely through the part chosen for the operation, after which it is removed, and the ends of the silk left hanging from the wound. It is dressed once or several times a day with some mild ointment; or, if this is not sufficient to keep up the discharge, a more stimulating ointment is used. Escharotics are employed to destroy morbid growths, warts, polypi, condylomata, fungous granulations, etc.; also to relieve violent inflammation by their substitutive action; to stimulate indolent ulcers, sinuses, etc.; to open abscesses of the liver and other internal viscera, the

method of "aspiration" being preferred; to remove cancer, lupus and other morbid growths; to decompose the virus of rabid and venomous animals, and of chancres and malignant pustules, and prevent their absorption.

Escharotics include such agents as caustic potassa, fused nitrate of silver, caustic soda, solution of nitrate of mercury, corrosive chloride of mercury, bichromate of potassium, the mineral acids, sulphate of copper, and the substances before referred to.

## DEMULCENTS.

Demulcents, also called *Lentitives*, are medicinal substances which soften and relax the tissues. When applied to irritated or inflamed surfaces these agents diminish the heat, tension and pain. They consist principally of gum or mucilage, often combined with saccharine or farinaceous substances, and, diluted with water, form viscid solutions. By modifying the acridity of the secretions, they are capable, to some degree at least, of relieving irritation in remote organs, although their constitutional effects are chiefly nutritive. Demulcents are employed internally to protect the gastro-enteric surface from irritating substances, especially poisons of an acrid nature; also to relieve irritation and inflammation of the alimentary canal in such affections as diarrhœa, dysentery, enteritis, gastritis, etc.; also in catarrhal affections, for their soothing and lubricating effects from direct contact, and also by reflex action; and they also exert some influence in modifying the acridity of expectorated matters; also in such affections of the urinary passages as cystitis, ardor urinæ, as they tend to diminish the acridity of the secretions; also as drinks, to promote the action of the secreting and exhaling organs, and to allay the thirst in fevers; also as light diet, and to suspend substances insoluble in water.

Demulcents are employed externally in the form known as *Emollients*, to relieve the heat, swelling and pain of inflammation, wounds and burns; to hasten suppuration, as detergents to cleanse foul ulcers, and to promote suppuration from granulating surfaces. Mixed with water in the form of soft

masses, they are commonly termed *cataplasms* or *poultices*, and have the effect of softening the parts to which they are applied as vehicles of heat and moisture. Included in the class of demulcents are such substances as gum arabic, flax-seed, tragacanth, slippery elm bark, sassafras pith, marshmallow, benne, quince seed, liquorice root, Iceland moss, Irish moss, starch, arrow root, tapioca, sago, barley, glycerin, pyroxylon, collodion, solution of gutta percha, honey, animal fats, such as lard, in form of cerate (lard, 2 parts, and white wax, 1 part), and suet, both containing stearine.

### ANTHELMINTICS.

Anthelmintics, or *Vermifuges*, are medicinal substances employed to destroy and expel worms (entozoa) from the alimentary canal. Their action differs according to the nature of the substance used, either to destroy by a direct poisonous influence or by mechanical means. The most powerful of the cathartics (drastic) also act as anthelmintics by the copious secretion and exhalation which they produce from the alimentary canal. When anthelmintics are employed, they must be persevered in for several days, with the occasional intervention of an active cathartic.

Belonging to this class are such agents as wormseed, spigelia, santonica, cowhage, male fern, oil of turpentine, kameela, pumpkin seed, kousso, calomel with gamboge, calomel with pink root, iron preparations, etc., etc.

### COLORING AGENTS.

Coloring agents are substances employed to communicate their peculiar color to pharmaceutical preparations. They include saffron, cochineal, red saunders, etc., etc.; and in dental practice, for coloring dentifrices, rose pink.

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In addition to the general classes mentioned, there are certain sub-classes recognized, which have not been specially referred to in the preceding definitions, as follows:—

| | | |
|---|---|---|
| Absorbents, | Deodorizers, | Hypnotics, |
| Anodynes, | Diluents, | Laxatives, |
| Antemetics, | Discutients, | Nervines, |
| Anthridrotics, | Disinfectants, | Nutritives, |
| Antiperiodics, | Emollients, | Purgatives, |
| Antiseptics, | Errhines, | Refrigerants, |
| Carminatives, | Escharotics, | Resolvents, |
| Caustics, | Expectorants, | Restoratives, |
| Cauterants, | Evacuants, | Sialagogues, |
| Constringents, | Excitants, | Stimulants, |
| Counter-irritants, | Febrifuges, | Styptics, |
| Desiccatives, | Hæmostatics, | Vesicants. |
| Detergents, | Hypersthenics, | |

### ABSORBENTS.

Absorbents, known also as *Desiccatives*, are medicinal agents capable of checking secretions, and drying up secretions or discharges from ulcers and suppurating wounds. Included in this class are tannic acid, oxide of zinc, charcoal, subnitrate of bismuth, starch, powdered galls, magnesia, powdered myrrh, carbonate of lime, etc., etc.

### ANODYNES.

Anodynes, which, with *sedatives*, *hypnotics* or *soporifics*, are included in the group of narcotics, are medicinal agents capable of alleviating pain. Included in this class are opium, morphia, chloroform, sulphuric ether, aconite, croton-chloral, belladonna, camphor, gelsemium, cannabis indica, stramonium, hyoscyamus, carbolic acid, atropine, creasote, etc., etc.

### ANTEMETICS.

Antemetics are medicinal agents capable of arresting vomiting. Included in this class are creasote, dilute hydrocyanic acid, lime water, chloral, chloroform, magnesia, dilute nitric acid, dilute phosphoric acid, belladonna, oxalate of cerium, etc.

### ANTHRIDROTICS.

Anthridrotics are medicinal agents capable of checking perspiration. Included in this class are oxide of zinc, sulphuric acid, acetic acid, tannic acid, sulphate of iron, hæmotoxylin, etc.

### ANTIPERIODICS.

Antiperiodics are medicinal agents capable of relieving periodical diseases, such as intermittent fevers, neuralgia, etc. Included in this class are cinchona, quinia, arsenic (in form of Fowler's solution), chloroform, chloride of soda, salicin, etc.

### ANTISEPTICS.

Antiseptics are medicinal agents capable of arresting fermentative processes, thereby preventing the decomposition of organic substances. When these agents are brought in contact with disease germs, they destroy their vitality. Included in this class are carbolic acid, creasote, salicylic acid, eucalyptus oil, iodoform, benzoic acid, boracic acid, pepsin, bromine, etc.

### CARMINATIVES.

Carminatives are medicinal agents capable of dispelling flatulence, and allaying pain in the stomach and bowels. Included in this class are such agents as cinnamon, cardamom, cloves, coriander, lavender, ginger, juniper, carraway, peppermint, etc.

### CAUSTICS.

Caustics are medicinal substances capable of destroying vitalized tissue. (See *Irritants*.)

### CAUTERANTS (See *Irritants*).

### CONSTRINGENTS (See *Astringents*).

### COUNTER-IRRITANTS,

Counter-irritants are medicinal agents which are employed to produce external irritation for the purpose of relieving or curing diseased action in another part, as in periodontitis, for example, when such agents as iodine, cantharidal collodion, creasote and iodine, ammonia, etc., etc., are applied to the gum over the root of the affected tooth. (See *Irritants*.)

### DESICCATIVES.

Desiccatives are medicinal agents capable of checking secretions, and arresting mucous discharges from ulcers, wounds, etc. (See *Absorbents*.)

### DETERGENTS.

Detergents are medicinal agents capable of cleansing ulcers, suppurating wounds, etc., by acting as either stimulants or emollients. Included in this class are such agents as borax, burnt alum, slippery elm bark, acacia, flax seed, tragacanth, etc.

### DEODORIZERS.

Deodorizers are medicinal agents capable of destroying infectious and fetid odors. Included in this class are carbolic acid, salicylic acid, creasote, chloride of lime, charcoal, permanganate of potash, thymol, chloride of zinc, solution of chloride of soda, oil of eucalyptus, iodoform, menthol, hydrochloric acid, nitric acid, sulphuric acid, etc., etc. (See *Antiseptics.*)

### DILUENTS.

Diluents are medicinal agents capable of diluting the blood, and thus increasing its fluidity; at the same time, exercising a solvent action, and eliminating a portion of the solid constituents. Included in this class are such agents as water, aerated water, mineral waters, rice water, beef tea, whey, barley water, gruel, etc., etc.

### DISCUTIENTS.

Discutients are medicinal agents capable of reducing and dispersing morbid growths, swellings, etc. Included in this class are iodine, mercury, bromide of potassium, iodide of potassium, chlorate of potassium, arsenic, colchicum, etc., etc.

### DISINFECTANTS.

Disinfectants are medicinal agents capable of depriving effluvia of their morbific properties by chemically combining with them. Included in this class are such agents as chlorine, carbolic acid, carbolate of lime, chloride of lime, salicylic acid, solution of chlorinated soda, charcoal, creasote, hydrochloric acid, sulphuric acid, nitric acid and chloride of zinc. (See *Antiseptics* and *Deodorizers.*)

### EMOLLIENTS.

Emollients, or *Protectives*, are medicinal agents capable of relaxing soft tissues, allaying irritation, protecting sensitive

surfaces, relieving pain in ulceration of mucous membrane. Included in this class are glycerine, collodion, solution of gutta percha, acacia, tragacanth, Irish moss, sassafras pith, flaxseed, slippery elm bark, liquorice root, wax, in the form of cerate ointment, poultices of bread and milk, yeast and flaxseed, and charcoal and yeast with flaxseed, lard, etc., etc.

### ERRHINES.

Errhines are medicinal agents capable of inducing a secretion from the nose. Included in this class are ammonia, ipecacuanha, chlorine, acetic acid, orris root, etc., etc.

### ESCHAROTICS.

Escharotics are medicinal agents capable of producing an eschar or slough, and are included among Irritants. (See *Irritants.*)

### EXPECTORANTS.

Expectorants are medicinal agents capable of promoting the excretion of mucus and other fluids from the air passages and lungs. Included in this class are squill, ipecacuanha, benzoic acid, preparations of ammonia, tartar emetic, balsam of tolu, myrrh, nitrate of potash, seneca, wild-cherry bark, lobelia, etc., etc. (*See Blennorrhetics.*)

### EVACUANTS.

Evacuants belong to the class of cathartics which promote alvine evacuations. (See *Cathartics.*)

### EXCITANTS.

Excitants belong to the class of stimulants which excite the vital powers, causing an increase of the circulation. (See *Stimulants.*)

### FEBRIFUGES.

Febrifuges are medicinal agents capable of diminishing the heat and allaying the thirst of fevers, and are generally recognized as *Refrigerants.* Included in this class are nitrate of potassa, chlorate of potassa, the mineral acids, spirits of nitrous ether, etc., etc.

### HÆMOSTATICS.

Hæmostatics are medicinal agents capable of arresting hemorrhage, and belong to the class of Astringents. (See *Astringents* and *Styptics.*)

### HYPERSTHENICS.

Hypersthenics belong to the class of Stimulants. (See *Stimulants.*)

### HYPNOTICS.

Hypnotics belong to the class of Narcotics, and are capable of causing sleep. (See *Narcotics.*)

### LAXATIVES.

Laxatives are mild cathartics. (See *Cathartics.*)

### NERVINES.

Nervines belong to the class of Neurotics, and are capable of relieving and curing disorders of the nerves. (See *Neurotics.*)

### NUTRITIVES.

Nutritives are medicinal agents capable of quickening assimilation and building up the organic tissues. Included in this class are cod-liver oil, gum arabic, glycerin, beef extracts, milk, manna, etc., etc.

### PURGATIVES.

Purgatives are active Cathartics. (See *Cathartics.*)

### REFRIGERANTS.

Refrigerants are medicinal agents which are capable of diminishing heat and allaying thirst. They are also called *Febrifuges.* Included in this class are nitrate of potassa, chlorate of potassa, solution of acetate of ammonia, acetic acid, citric acid, hydrochloric acid, nitric acid, tartaric acid, spirits nitrous ether, etc., etc.

### RESOLVENTS.

Resolvents belong to the classes of Alteratives and Emollients, being medicinal agents capable of reducing inflammation and dispersing morbid swellings. (See *Alteratives* and *Emollients.*)

## RESTORATIVES.

Restoratives belong to the classes of Stimulants and Tonics. (See *Stimulants* and *Tonics.*)

## SIALAGOGUES.

Sialagogues are medicinal substances capable of increasing the salivary secretion by a stimulant or irritant effect. By the excitant properties of these agents the lining membrane of the mouth is irritated, the effect extending along the ducts to the salivary glands, so that not only is the quantity of fluid exhaled from the mucous membrane increased, but salivation results. In this way depletion follows their employment, and more or less revulsive effect ensues, which may prove beneficial to distant parts affected by disease. Sialagogues may also prove useful in cases of paralysis of the tongue, etc., by their directly excitant properties; in such cases as local palsy of the tongue. They are occasionally employed as masticatories in odontalgia, and in such affections of the head as may indicate the use of substances which excite irritation in and increased discharge from the lining membrane of the nasal cavities. Included in this class are pyrethrum, horse radish, calamus, ginger, tobacco, calomel, corrosive sublimate, blue mass, iodide of mercury, etc.

## STYPTICS.

Styptics, which belong to the class of *Astringents*, are medicinal agents capable of arresting hemorrhage when employed externally. They are divided, according to their action, into *chemical* and *mechanical*, the chemical styptics coagulating the blood exuding from the part, and at the same time stimulating the tissues to contraction; whilst the mechanical, as lint, felt, spider's web, plaster of Paris, etc., detain the blood in their meshes, or absorb it until it coagulates, and thus arrest the hemorrhage. Among the Astringents which may be classed as Styptics, are tannic acid, persulphate of iron solution, powdered subsulphate of iron, alum, nitrate of silver, powdered galls, sulphuric acid, matico, gallic acid, perchloride of iron.

### VESICANTS.

Vesicants, which belong to the class of *Epispastics*, are medicinal agents capable of producing a serous exudation beneath the cuticle. Included in this class are cantharides, cantharidal collodion, glacial acetic acid, strong solution of ammonia, mustard, etc., etc. (See *Epispastics*.)

## FORMS IN WHICH MEDICINAL SUBSTANCES ARE EMPLOYED.

ALKALOIDS are bases capable of combining with acids to form salts, and which exist as proximate principles in certain vegetables, and possess the properties of an alkali in a greater or less degree. Alkaloids are therefore the active principles of medicines.

BATHS. *Medicinal Baths* are composed of tepid water, with the addition of saline, emollient, narcotic or stimulant substances, such as salt, mustard, etc., etc.

CATAPLASMS are poultices or plasters composed of soft, macerated preparations, to be applied externally.

COLLYRIA are preparations applied to the eyes. They are sometimes dry, but generally liquid, consisting of infusions, decoctions or distilled waters, with the addition of various medicinal substances.

CONFECTIONS, or *Electuaries*, are preparations made into a pulpy mass, with sugar or honey, mucilage or glycerin.

DECOCTIONS are solutions made by boiling certain vegetable ingredients in a fluid, for the purpose of extracting the parts soluble at that temperature.

EMULSIONS are preparations composed of oils, resins, etc., suspended by means of mucilage, yolk of egg, sugar, etc.

ENEMATA, or *Clysters*, are liquid preparations injected into the rectum by means of a syringe, as auxiliaries to or substitutes for cathartics.

EXTRACTS are preparations obtained by the evaporation of a vegetable solution, in the form of juices, infusions or decoctions, to a more or less fluid consistence.

FOMENTATIONS are fluid preparations applied to the surface of the body by means of a sponge, flannel or soft cloth.

FUMIGATIONS are the vapors of medicinal substances employed to purify infected air by absorbing or otherwise counteracting deleterious gases. They are also employed in diseases of the skin, and may be sometimes substituted for a local bath.

GARGLES are washes for the mouth and throat, and are generally astringent and stimulating, sedative, refrigerant, etc. To be of any service, gargles or mouth washes must be frequently applied and persevered in for some time. They are employed in cases of inflammation and ulceration of the mucous membrane of the mouth and fauces.

GLYCERITES are solutions of medicinal substances in glycerine.

INFUSIONS are preparations obtained by pouring a hot or cold fluid upon vegetable substances, for the purpose of extracting their medicinal properties.

INHALANTS are remedies in the form of steam, for inhalation directly to the lungs.

INJECTIONS are medicated fluids thrown into a natural or preternatural cavity of the body by means of a syringe.

LINIMENTS, or Embrocations, are unctuous medicinal preparations to be applied externally by means of friction.

LOTIONS are liquid preparations, or washes, to be applied to the body externally.

MIXTURES are fluid preparations containing several medicinal ingredients, to be administered by the mouth.

OINTMENTS, or Cerates, are preparations of the consistence of lard, composed of wax, lard, or resin, with solid or liquid ingredients, for topical application. Cerates are somewhat harder than ointments, especially where wax is substituted for the lard.

PILLS are simple or compound medicinal agents, of a firm consistence, spherical or globular in shape, and generally not exceeding five or six grains in weight.

PLASTERS are preparations of a solid glutinous composi-

tion, which, at the ordinary temperature of the body, adheres to the part on which it is placed.

SUPPOSITORIES are solid preparations, of a round, cylindrical, or conical form, to be introduced into the anus; and are composed of sedative, astringent, or purgative medicines, combined with suet, cocoa-butter, honey, or soap.

SYRUPS are liquid conserves, made by dissolving sugar with some plant, or in water, either with or without medicinal impregnation.

TINCTURES are preparations in the form of solutions of the active portions of medicinal substances, in rectified or proof spirits. A tincture is called *simple* when it holds only one substance in solution, and *compound*, when two or more ingredients are submitted to the solvent.

# DENTAL MATERIA MEDICA AND THERAPEUTICS.

## ACACIA—GUM ARABIC.

*Source.* A thorny tree or shrub, of Arabia and Africa.

*Description.* The concrete juice which exudes spontaneously from the stem of the Acacia vera, in the form of a gum, which hardens, on exposure, in small, irregular, or roundish or oval pieces, of various sizes, more or less transparent, hard, brittle and pulverizable. It is generally either white or yellowish white, but sometimes of a deep orange or brownish color; the powder, however, being pure white. It is inodorous, with a feeble, slightly sweetish taste, and when pure dissolves wholly away in the mouth.

In water it forms a viscid solution, known as mucilage.

It is insoluble in alcohol, ether and the oils. When kept dry, it undergoes no change.

*Chemical Constituents.* It consists of a peculiar proximate principle known as *Gum* or *Arabin*, composed chiefly of a soluble acid substance, *Gummic Acid* ($H_2C_{12}H_{18}O_{10}H_2O$), combined with 3 per cent. of lime, forming a soluble salt, gummate of calcium.

*Medicinal Properties and Action.* Demulcent and emollient. It forms an excellent adjunct to other medicinal substances of the same class, and an ingredient in all the officinal lozenges.

*Dose.* Of the Gum, ℥j *ad libitum.* Of the Mucilage (℥iv, water ℥vj) ℥ij to ℥vj daily, or *ad libitum.*

*Therapeutic Uses.* Coughs and hoarseness, gastro-intestinal irritation, infantile diarrhœa, epistaxis and superficial hemorrhages; applied in the form of fine powder.

*Dental Uses.* As an emollient, in the form of mucilage, to cover and protect inflamed surfaces of mucous membrane.

As a mechanical styptic, in a finely-powdered form, in superficial hemorrhages, such as from leech-bites, etc.

Combined with borax, it is a useful application for inflamed mucous membrane.

DENTAL FORMULA.

*For Inflamed Mucous Surfaces.*

℞. Pulveris Acaciæ..... ..... ℥ij
Sodii Boratis..... ℥ij.
Fiat pulvis.
SIGNA.—Apply to inflamed part.

## ACIDUM ACETICUM—ACETIC ACID.

*Formula.* $HC_2H_3O_2$.

*Derivation.* Purified Pyroligneous Acid. Prepared from wood by destructive distillation; contains 28 per cent. of anhydrous acetic acid. Specific gravity 1.047.

DILUTE ACETIC ACID—*Acidum Aceticum Dilutum*, the only form in which it is employed internally, is prepared by mixing one pint of acetic acid with seven pints of distilled water. Specific gravity 1.006.

*Medical Properties and Action.* Refrigerant, diaphoretic, astringent, diuretic, stimulant, tonic. It allays restlessness by allaying thirst, and acts upon the skin and kidneys; also acts as an antiscorbutic. The strong acid applied to the skin causes intense redness and pain, followed by rapid vesication.

*Dose.* Of Acetic Acid, gtt. iij to x. Of Dilute Acetic Acid, ℥j to ij.

*Therapeutic Uses.* Fevers, night sweats, diarrhœa, scurvy, hemorrhage of the lungs, stomach and nose. Externally, the strong Acetic Acid is applied in tinea capitis, psoriasis, cancer, corns, and warts; the dilute form is applied externally to gangrene, ulcerated throat, in the form of gargle, ulcers, sprains, and bruises. Owing to its volatility and pungency, its vapor, when applied to the nostrils, acts as an excitant in syncope, headache, etc.

*Dental Uses.* Acetic Acid is externally employed in indolent ulcers of the mouth, cancrum oris, and scurvy. In the form

of Glacial Acetic Acid—*Acidum Aceticum Glaciale* (Concentrated Acetic Acid), it is applied externally, as a caustic in fungous growths of gum, dental pulp, etc. In cancerous ulcerations of mucous membrane, it relieves the pain, and promotes a healthier condition.

DENTAL FORMULÆ.

*For Indolent Ulcers of the Mouth, Cancrum Oris, Scurvy.*

℞. Acidi Acetici.....f℥iij
Aquæ.....f℥v.
Fiat. solution.
SIG.—Apply with a camel's-hair brush.

*For Inflamed Fauces.*

℞. Acidi Acetici.....f℥ij
Ammonii Chloridi.....℥j
Mellis.....f℥jss
Aquæ.....f℥xij.
Fiat. Gargarysma.

## ACIDUM ARSENIOSUM—ARSENIOUS ACID.

### WHITE OXIDE OF ARSENIC—ARSENIOSUM OXIDUM.

*Formula.* $As_2O_3$.

Arsenic-arsenicum, the metal from which arsenious acid is obtained, is not employed as a medicine in its native state. It is combined with sulphur and certain metals, and is hard, brittle, crystalline, of a steel-gray color. When heated to a dull redness, it volatilizes in the form of a colorless vapor, with an odor like that of garlic—alliaceous. It is generally found in cobalt ore. It is a powerful poison.

*Derivation.* Arsenious Acid is obtained by roasting arsenical ores, and purifying by sublimation. It is in the form of a fine white powder, which is often adulterated with chalk, lime, etc.; hence it is better to procure it in the solid form or lump, which is of a milk-white color externally, and often perfectly transparent internally. It has no odor, and is therefore liable to be mistaken for more innocent substances, and scarcely any taste, or merely a faint, sweetish impression.

*Medical Properties and Action.* Arsenious Acid in large doses is a virulent irritant poison, but in doses of one-sixtieth to one-twelfth of a grain, properly administered, it is a tonic, increasing the appetite and improving the secretions, both in quality and quantity. In larger doses, in the form of Fowler's Solution—*Liquor Potassii Arsenitis* (prepared by boiling 64 grains of arsenious acid and bicarbonate of potassium, each in

half a fluid ounce of distilled water, then adding 12 fluid ounces more of distilled water, half a fluid ounce of compound spirit of lavender, and afterwards water enough to make the solution measure a pint)—it is a powerful antiperiodic. In small doses, administered for a considerable time, it modifies the blood, and through it nutrition, so as to remove various morbid conditions. When continuously used, a sensation of heat in the throat, œsophagus and stomach is sometimes experienced, with nausea, pain in the stomach and occasional vomiting; also, great languor or depression of spirits, with redness of the eyes, swelling of the eyelids and œdema of the face; hence, at the first evidence of such symptoms, the remedy should be discontinued until they have passed away. When continually increasing doses are administered, the arsenic accumulates, and poisonous symptoms quickly appear; hence, it is recommended to begin a course of arsenic with large doses, and the quantity given regularly reduced. When arsenious acid is administered, the bowels should be well evacuated by a purgative given previously, and the arsenic taken directly after a meal, but never upon an empty stomach, on account of gastric irritation. Its use should be omitted for a day or two every two or three weeks, and a mild aperient employed, in order to prevent the accumulation of the arsenic in the system. A few drops of laudanum added to the arsenical preparation will prevent nausea and vomiting. All arsenical preparations should be administered with the greatest regularity, at stated times.

During the employment of arsenic the eyes of the patient should be examined daily, and if the eyelids and conjunctiva become inflamed the remedy should be discontinued; also, when the urine, from being pale and copious, becomes scanty, acid and high-colored, the arsenic should be suspended.

Poisonous symptoms have been caused by half a grain of arsenious acid, and fatal effects have followed the administration of two grains, although much larger quantities have been taken with impunity; very large quantities often causing emesis, which removes the substance from the stomach, and

thus prevents fatal effects. When the idiosyncrasies of the patient are unknown, it is better to use small doses before beginning with large doses. The quantity of arsenic required to produce a fatal effect varies according to the susceptibilities of the patient and the state of the stomach. Much, however, depends on the idiosyncrasies of the individual, which differ greatly in different persons. When large quantities are taken, the effects are sometimes manifested on the cerebro-spinal system, death following, from narcotism, in a short time.

When arsenious acid is swallowed or applied to a denuded surface, it is rapidly absorbed into the system; hence it is a dangerous agent, and in every case should be carefully used, and its effects closely watched. It possesses a very powerful antiseptic property, arresting the process of putrefaction. The stomach and alimentary canal of persons who have died from its effects have been found in a perfect state of preservation for a long time after interment.

Poisonous doses produce great intestinal inflammation, with ulceration in some cases, and rarely, gangrene. It has also been detected after death, in the blood, in the urine, and also in the liver, spleen, kidneys, muscles and stomach. A certain degree of tolerance in the use of arsenic may be established, where poisonous doses can be taken with impunity. Such a state may be produced by the constant legitimate use of the agent, or in the cases of those who begin the habit of arsenic eating at an early age, and who find this practice of service in increased breathing power, strength, and improved bodily condition. As long as such a habit is continued, no ill effects are apparent, but as soon as the arsenic is discontinued, symptoms resembling those of poisonous doses make their appearance.

Arsenious acid acts locally as an escharotic, but while a true escharotic acts chemically, producing decomposition of the part to which it is applied, a state incompatible with life, arsenic destroys the vitality of the organized structure, and its decomposition is the consequence. This distinction should be remembered in the use of arsenious acid in dental practice.

Arsenic is eliminated by the liver, kidneys, intestinal canal

and bronchial tubes; and it is thought that some of the symptoms produced by it have their origin in the local effects of the poison on the channels of excretion.

The symptoms of gastro-intestinal arsenical poisoning—the more common form—are described by Bartholow as follows: Burning sensation at the epigastrium, and extending over the abdomen; violent and uncontrollable vomiting; excessive dryness of the mouth and fauces, intense thirst, intestinal irritation, bloody and offensive stools, retracted abdomen, strangury, suppression of urine, or bloody urine, and in females menorrhagia; rapid and feeble action of the heart, oppressed breathing, great agitation and restlessness, shrunken features, cold breath, involuntary evacuations, collapse; consciousness being retained to the end.

The symptoms of the cerebral form of arsenical poisoning are profound insensibility and coma, similar to extreme opium narcosis. The effects of arsenical poisoning, when not fatal, are felt for a long time in the form of gastro-enteric irritability, an irritable condition of the skin, stiffness of the joints, neuralgic pains, numbness, formication, paralysis, etc.

After death from arsenical poisoning, the gastro-intestinal mucous membrane exhibits deep redness, erosions, ecchymosis and softening. Death generally occurs in the midst of convulsions, followed by rigid spasm of the whole body.

When arsenic has been injudiciously administered for too long a period, in addition to the irritation of the conjunctiva, swelling of the face, desquamation of the skin, etc., salivation has been observed in some instances, and at times a peculiar silvery whiteness of the tongue.

*Dose.* Of Arsenious Acid, gr. $\frac{1}{60}$ to gr. $\frac{1}{12}$, in pills with bread crumb three times a day. Of Liquor Potassii Arsenitis (Fowler's Solution), ♏ij to ♏x, three times a day; each fluid drachm contains half a grain of arsenious acid.

Arsenic is contraindicated in infancy and childhood; in all sthenic diseases accompanied by strong arterial action; in all irritable conditions of the stomach and alimentary canal; and in all inflammatory pulmonary affections.

*Therapeutic Uses.* In intermittent and periodic diseases, such as malaria, neuralgic and spasmodic diseases, being of great value in neuralgia, especially when of a malarial type, hemicrania, chronic rheumatism, asthma, whooping-cough, chorea, diseases of the skin, vomiting of pregnancy, hay fever, irritative dyspepsia, uterine affections, bites of venomous snakes, etc. Externally, it is applied to cancerous growths; hypodermically, in cases of local chorea.

Arsenic is also employed medicinally in the forms of Arseniate of Iron (*Ferri Arsenias*) and Arseniate of Soda (*Sodæ Arsenias*).

*Dental Uses.* The devitalizing power of arsenious acid being far more powerful than its escharotic power, it has been employed for many years to destroy the vitality of the pulps of teeth, for which purpose it is generally combined with either the acetate or sulphate of morphia and sufficient creasote to form a paste, to prevent, or at least mitigate, the extremely painful action of the arsenic when topically applied to living tissue. It was formerly supposed that creasote was a solvent for the arsenic, but this is now denied. Carbolic acid may be substituted for the creasote.

As the danger of absorption is great, there is considerable risk in applying arsenious acid to the teeth of young persons, or those very susceptible to the influence of this agent; hence other escharotics, such as repeated applications of carbolic acid, or pepsina porci, with dilute hydrochloric acid, or nitric acid, chromic acid, or chloride of zinc, or the galvanic cautery, or the surgical method of introducing into the body of the pulp a barbed wire, are employed in such cases. The arsenious acid, when employed for the devitalization of dental pulps, has been combined with pulverized charcoal, under the impression that the latter prevents the rapid absorption of the arsenic, and thus limits its action mechanically rather than therapeutically.

The creasote (or carbolic acid), employed in combination with the arsenious acid as a nerve paste, obtunds sensibility, acting as a styptic, antiseptic and escharotic; hence some

depend upon this agent alone to modify the action of the arsenic, and dispense with the morphia.

Tannic acid and tincture of aconite are sometimes substituted for the morphia and creasote, or carbolic acid, in the preparation of a nerve paste. Arsenious acid is also employed alone, in the form of the dry powder, to devitalize pulps of teeth; but it is not only more painful, but less prompt in its action than when it is combined with other agents. Previous to the application of the arsenical preparation, chloroform, tincture of aconite, or sulphate of atropia, may be applied to the exposed portion of the pulp, and the painful effect of the arsenic be thus modified. The spray of rhigolene, or absolute ether, has also been employed for this purpose.

The quantity of arsenious acid to be employed for devitalization will depend upon the structure and class of the tooth, varying from the $\frac{1}{25}$ to the $\frac{1}{20}$ of a grain; also the length of time the arsenical preparation should remain in the tooth, as the condition of the pulp and tooth, the age of the patient, the quality of the tooth structure and the susceptibility of the patient should all be considered. While in most cases pulps are readily devitalized by the application of a moderate quantity of the agent, in other cases, it appears to be impossible to accomplish this object, without extra measures are resorted to. In teeth of a soft, frail structure, owing to an excess of organic matter, the arsenic is rapidly absorbed; but if, on the other hand, the tooth is of a dense structure, the retention of the arsenical preparation for a much longer time may not be attended with any injurious effects, such as periosteal inflammation. From twelve to twenty-four hours are generally required to enable the arsenious acid to properly devitalize the pulp of a tooth; the difference in time depending upon the quantity of the acid employed, as well as upon other circumstances already enumerated. To produce a speedy effect, the pulp should be freely exposed by the careful application of the excavator, and the devitalizing agent applied directly to the surface of the organ. Accuracy as to the quantity of the arsenious acid to be employed may be arrived at by having a

grain divided into twenty or twenty-five parts, by weight, in the form of the dry powder. A pellet of cotton, on the end of an excavator, may then be saturated with creasote or carbolic acid; and the desired quantity of the powder, being taken up on the pellet, can be placed directly in contact with the exposed surface of the pulp, and secured in the carious cavity by means of a second pellet of cotton, saturated with either sandarach or shellac varnish, a solution of gutta percha and chloroform, wax, or softened gutta percha.

Some prefer to wound the pulp, so as to draw blood, before the application of the arsenical preparation is made, and thus insure its speedy action. Care is necessary that the arsenic should be completely secured in the carious cavity, and no portion of it come in contact with the parts outside of the tooth. In the case of proximal cavities, a roll of bibulous paper, saturated with sandarach varnish, may be pressed between the teeth, beyond the cavity, and thus prevent the arsenical preparation from coming in contact with the gum and cheek. After the devitalization of the pulp has been accomplished, it is necessary that every particle of the arsenic should be removed from the tooth. The effect of permitting the agent to remain in the tooth for a longer time than is necessary for the devitalization of the pulp only, is periosteal inflammation. Where several applications of the arsenical preparation fail to produce the desired devitalization, the resistance thus offered to the influence of the agent may be owing to several causes: a granulated, protective covering, which is formed over the surface of the exposed portion of the pulp, which defends it from the action of the arsenic; or, extraordinary vital power in the pulp, which may be due to the peculiar constitution of the patient, who probably would not be as susceptible to the action of arsenic as the majority of persons are, even if it were administered by the mouth.

Such resistance to the action of the devitalizing agent may be overcome, either by the removal of the granulated surface where it exists, or, in cases of non-susceptibility, by puncturing the pulp with a pointed instrument, charged with the arsenical

preparation; first taking the precaution to obtund the sensibility of the organ by the application of a benumbing agent.

Arsenious acid is also employed in dental practice to obtund the undue sensitiveness of dentine, but less frequently now than in past years, as its action is due more to a devitalizing energy than to a chemical action, such as a true escharotic produces. As it is capable of being absorbed through a considerable thickness of dentine, the result of which would be the death of the pulp, arsenious acid, if it is employed for obtunding the sensibility of the dentine, should be suffered to remain in the tooth but a very short time—from one to three hours—and every particle of it carefully removed. As there are many agents which prove effective for such a purpose, it is much better to refrain from the use of arsenious acid as an obtunder of dentinal sensibility.

### DENTAL FORMULÆ.

*For Devitalizing Pulps of Teeth.*

FLAGG.

℞. Acidi Arseniosi.....gr. j
Morphinæ Acetatis.....gr. ij
Acidi Carbolici.....gtt. iij. M.
Fiat massa.

SIGNA.—The proper quantity to remain 12 to 24 hours.

℞. Acidi Arseniosi.....gr. xx
Morphinæ Acetatis.....gr. x
Creasoti .....q. s.
To make a thick paste.

SIGNA.—To remain 12 to 24 hours for adults; 8 to 10 hours for children.

J. D. WHITE.

℞. Acidi Arseniosi.....gr. ij
Morphinæ Sulphatis.....gr. j
Creasoti.....q. s. M.
Fiat massa.

SIGNA.—To remain from 12 to 24 hours.

PIERCE.

℞. Acidi Arseniosi.....gr. x
Morphinæ Sulphatis....gr. xx
Creasoti.....q. s.
To make a thick paste.

SIGNA.—To remain 24 hours for adults; 10 hours for children.

GARRETTSON.

℞. Acidi Arseniosi
Morphinæ Acetatis..āā..gr. x
Creasoti.....q. s.
To make a thick paste.

SIGNA.—To remain 24 hours for adults; 10 hours for children.

If a very irritable condition is present, Sulphate of Atropia may be substituted for the Morphia.

HOLLANDER.

℞. Acidi Arseniosi.....gr. xij
Morphinæ Acetatis.....gr. ij
Olei Caryophylli.....gtt. iv
Creasoti .....q. s.
Ut fiat pasta.

℞. Acidi Arseniosi.....gr. v
Acidi Tannici.....gr. x
Tincturæ Aconiti.....q. s.
To make a thick paste.
SIGNA.—To remain 24 hours.

*To Destroy Cancerous Tumors.*

℞. Acidi Arseniosi..... ʒ j.
Adipis
Cerati Cetacei...:.āā..... ʒ vj.
SIGNA.—Melt the cerate and lard over a slow fire, and then stir in the arsenic, and triturate carefully in a glass mortar.

℞. Acidi Arseniosi.....gr. x
Morphinæ Acetatis.....gr. xl
Creasoti, vel Acidi Carbolici..q. s.
To make a thick paste.
SIGNA.—To remain 12 to 24 hours.

*For Malignant Ulcerations of a Cancerous Character.*

℞. Liquoris Hydrargyri Nitratis..f ʒ j.
A powerful caustic.
SIGNA.—Applied by means of a camel-hair brush, and the parts then covered with lint.

*Tests for Arsenic.* Arsenic, in the solid state, may be detected by its volatility; heated over a spirit-lamp, it passes off in the form of a white vapor, devoid of smell, and is deposited on a cool surface, as an amorphous powder, or in octahedral crystals. When arsenic is thrown on burning charcoal, it is deoxidized, and gives out the garlic odor of metallic arsenic. When heated in a glass tube with charcoal or black flux, it sublimes, and condenses in the form of a brilliant steel-gray ring or mirror.

The following reagents will detect it when it is in aqueous solution: Sulphuretted hydrogen, or sulphide of ammonium, produces a lemon or yellow sulphide of arsenic; the addition first of ammonia, and then of nitrate of silver, produces a light-yellow arsenite of silver; the addition of potassa, and then of sulphate of copper, produces a light-green arsenite of copper. The most delicate test, however, is that of nascent hydrogen, known as Marsh's Test, which consists of subjecting the arsenic to the action of nascent hydrogen (evolved by the action of diluted sulphuric acid on pure zinc); it is deoxidized, and unites with the hydrogen to form arseniuretted hydrogen gas, which has the odor of garlic, and burns with a bluish-white flame, depositing a black spot of metallic arsenic on the surface of a cold plate held directly in the jet.

Reinsch's Test consists in boiling the suspected material with hydrochloric acid and clean copper foil, when, if any

arsenic is present, the copper foil becomes coated with gray metallic arsenic.

COBALT—*Cobaltum* (*Formula*, Co)—is a metal chiefly found in combination with arsenic, either in the form of the arsenide (*tin-white cobalt*), or as gray cobalt ore, with sulphur and arsenic. The late Dr. Robert Arthur preferred cobalt as a devitalizing agent to arsenious acid, being of the opinion that less irritation followed its action, and consequently greater immunity from periosteal inflammation. Others, however, do not regard cobalt as being any safer, but, on the other hand, less prompt in its action as a devitalizing agent.

## ACIDUM BENZOICUM—BENZOIC ACID.

*Formula*, $HC_7H_5O_2$.

*Derivation.* Benzoic Acid is obtained from benzoin (a balsamic resin, which exudes from the incised stem of a tree of Sumatra, Java, Borneo and Siam), either by sublimation or by the action of alkalies; it is also made from hippuric acid. It is in the form of white feathery crystals, of a silky lustre, a peculiar, agreeable odor and warm, acidulous taste. While it is sparingly soluble in cold water, it is more soluble in warm or boiling water, and very soluble in alcohol, solutions of potassa, soda, ammonia, lime, and concentrated sulphuric and nitric acids. The fixed oils also dissolve it. From solution it crystallizes in transparent prisms. It is also inflammable.

*Medical Properties and Action.* Benzoic acid is stimulant, particularly of mucous surfaces, and its vapor causes great irritation of the air passages. It is also antiseptic and expectorant, and some claim that it is a more powerful antiseptic than carbolic acid. Like salicylic and boracic acids, it prevents fermentations and putrefaction and destroys minute organisms. In the system, it is converted into hippuric acid, by the assumption of the elements of glycocoll, and in this form is excreted in the urine; a large part is excreted by the kidneys, as benzoic acid.

*Therapeutic Uses.* Benzoic acid is employed in chronic cys-

titis, gout, calculous diseases, jaundice, incontinence of urine in children, etc.

*Dose:* gr. x.

*Dental Uses.* Benzoic acid may be employed as an antiseptic in suppurating and gangrenous conditions of the pulps of teeth and mucous membrane; also as a local hæmostatic in combination with powdered alum. It forms one of the ingredients of Dr. Chapin A. Harris' Gum Wash.

The tinctures of benzoin are employed in the treatment of unhealthy or sloughing wounds, flabby granulations, foul ulcers, as they destroy the fetor and stimulate to a more healthy growth. In the antiseptic employment of benzoic acid, it may be used as a substitute for boracic and salicylic acids. The addition of borax will increase its solubility in water.

Benzoate of Ammonium—*Ammonii Benzoas*—will dissolve phosphatic calculi, if its use is long continued.

Benzoated Lard, when employed in the preparation of ointments, prevents chemical change, such as rancidity or acridity. It is prepared by digesting, at a moderate heat, ℥ij of powdered benzoin with a pound of lard.

Listerine, the formula of which is thyme, eucalyptus, baptisia, gaultheria, and mentha arvensis, in combination, each fluid drachm also containing two grains of benzo-boracic acid, is largely employed as an antiseptic, deodorizer, and disinfectant, in surgical practice, in the form of a lotion, a gargle, a dressing, or an injection. In dental practice, listerine is reliable in carious teeth, ulcerations of mucous membrane, and wounds of the mouth, in the form of a lotion or dressing; for alveolar abscesses, in the form of an injection; after the extraction of teeth, as a mouth-wash; and for offensive breath, as a gargle. It may be employed in its full strength, or in various degrees of dilution with water.

For such diseases as diphtheria, catarrh, dysentery, scarlatina, erysipelas, smallpox, different forms of fevers, etc., the dose is one teaspoonful three or more times a day (as indicated).

## ACIDUM CARBOLICUM—CARBOLIC ACID.

PHENIC ACID; PHENYL ALCOHOL; PHENYLIC ACID.

*Formula*, $C_6H_5OH$.

*Derivation.* Carbolic acid is obtained from coal tar by fractional distillation and subsequent purification, being extracted from that part of the heavy coal-tar oils which distill over between 150° and 200° Centigrade. Specific gravity 1.065.

When pure, it is in the form of colorless acicular crystals, which at 95° F. become an oily liquid, possessing a strong odor and taste, closely resembling creasote, which it resembles in characters and properties, although it is a different substance. Much of what is called creasote is nothing but impure carbolic acid (*Acidum Carbolicum Impurum*), combined with two other substances, similar in constitution, and known as *creasole* and *phosole*.

Chemically considered, carbolic acid is an alcohol rather than an acid, and its crystals readily absorb moisture on exposure to the air, and are thus liquefied.

It crystallizes at 70° F., and becomes liquid at from 90° to 95° F., and fuses at 93° to 106°. It is freely soluble in alcohol, ether, chloroform, glycerine and the essential oils. When carbolic acid is liquefied and discolored by exposure, it is difficult to detect it from creasote, as it possesses the same odor, taste, caustic properties, and a like affinity for albumen. Carbolic acid is soluble in from twenty to twenty-three parts of water, the purest being the most soluble. A small quantity of water will convert it into the liquid state, but will not dissolve it. Crystallized carbolic acid may be dissolved by a small quantity of cologne water; and to prevent recrystallization and prepare it for use in the form of injections, for example, the bottle containing it should be warmed by immersion in hot water, until it becomes fluid, and about five per cent. of rectified alcohol, or a few drops of glycerine, be added.

The red color which it assumes on exposure is thought to be caused by the ammonia in the air, and also to the presence of copper in the acid, which is affected by the ammonia of the atmosphere.

*Medical Properties and Action.* Carbolic acid resembles creasote so closely, in many of its characters and medicinal properties, that the therapeutic applications are the same in the case of both of these substances. Many, however, consider carbolic acid to be more efficacious in obstinate discharges than creasote; and also less irritating in its crystalline form when applied to very sensitive organs, such as the pulp of a tooth.

In its pure state it is escharotic; when diluted, it is rubefacient, anæsthetic and antiseptic. Internally administered, it is sedative and carminative, possessing the power of allaying vomiting and gastric irritability.

As an antiseptic, Prof. Lister regards carbolic acid to be superior to all other agents, as it is a most potent poison to all the low forms of life which determine putrefaction, as it retains this power, even when diluted to such a degree as to be almost entirely unirritating to the tissues of the human body. One per cent. in strength is sufficient to destroy bacteria, vibrios, etc. On account of its volatility, the vapor of carbolic acid is also efficacious as an antiseptic. As a local anæsthetic, it exerts a very soothing influence upon painful tissues; hence it is beneficial in odontalgia and for pulp dressing. On account of its solubility, a variety of solutions of special value can be formed with it, which are especially serviceable as antiseptic applications.

The application of large quantities of carbolic acid to an extensive surface is, however, dangerous, as cases of fatal poisoning have resulted by the absorption of this acid; hence care is necessary in its use as an external application.

Its nauseous odor and taste and its caustic action render it objectionable, unless greatly diluted, for internal administration. To obviate such objections, it is recommended to use it in the form of sulpho-carbolates.

When applied to the skin or to mucous membrane, it produces a burning sensation, of short duration, and the eschar is at first whitish, afterwards becoming brown or black, and surrounded by a zone of inflammatory redness; and, notwith-

standing its power to coagulate albumen, is rapidly diffused into the blood. Carbolic acid exists in the blood as a carbolate; and the blood itself does not appear to undergo any change in its corpuscular elements. It is in part consumed in the body, and the products of its combustion are excreted in the urine. Solutions of carbolic acid of adequate strength will check suppuration, and correct the fetor of ulcers, etc.

*Therapeutic Uses.* Internally, it is employed for nausea and vomiting due to an irritable state of the stomach, in scarlatina, measles and smallpox, pyrosis, etc.; as a gargle in diphtheria; as an inhalation in chronic nasal catarrh, hay asthma, whooping-cough, phthisis, etc.; as an injection in chronic cystitis, primary syphilis, erysipelas, pleuro-pneumonia and uterine diseases; as a lotion in gangrenous and other ill-conditioned ulcers, carbuncle, poisoned wounds, burns, skin diseases, scrofulous ophthalmia and itching of the skin.

*Dose.* Of crystallized carbolic acid, gr. j to gr. ij, largely diluted. A better form, however, is *one drop* of the crystallized acid, liquefied by heat, in one ounce of mucilage, three times a day. The dose of glycerite of carbolic acid (*Glyceritum Acidi Carbolici*), made by rubbing together ʒij of carbolic acid with Oss of glycerine, is ♏iv.

The dose of carbolic acid water (*Aqua Acidi Carbolici*) fʒx; of the glycerite, dissolved in distilled water, enough to make the mixture measure a pint, the dose is fʒss to fʒj.

Impure carbolic acid is employed for disinfectant purposes.

Ointment of carbolic acid (*Unguentum Acidi Carbolici*)—Carbolic acid, ʒj; lard, ʒj.

Sulpho-carbolic acid ($HC_6H_5SO_4$) is considered to be a very efficient antiseptic and disinfectant.

Sulpho-carbolate of zinc, $Zn(C_6H_5SO_4)_2H_2O$), combines the virtues of zinc salts and carbolic acid, and is used, internally, in diarrhœa, and, externally, in aqueous solution of from three to six grains to the ounce, as a dressing for wounds and ulcers and an injection in gonorrhœa.

Sulpho-carbolates of sodium, potassium, magnesium, calcium

and quinia are employed as antiseptics in cholera and zymotic diseases generally.

*Dental Uses.* Carbolic acid being antiseptic, styptic, escharotic, stimulant and sedative, or narcotic, is a valuable agent in dental therapeutics. When applied to carious dentine, it not only obtunds sensibility, but arrests putrefactive changes in the devitalized structure, and coagulates the albuminous elements at the ends of the dentinal tubuli. It relieves odontalgia when applied to the surface of an exposed and painful pulp. It is also invaluable in the treatment of alveolar abscess; and, in combination with iodine or other agents, it is often employed with beneficial effects in the treatment of dental periostitis. When employed in the treatment of alveolar abscess, as an antiseptic, although the discharge of pus may be increased for a short time after its application, there is soon manifested a decided diminution in the quantity secreted. When applied to a suppurating pulp, it arrests putrefaction, and induces a healthy action without irritation. It is also a valuable antiseptic application in ulcerations of the mucous membrane of the mouth, gangrenous conditions and mercurial stomatitis; for such purposes being combined with glycerine and other agents. Applied to exposed pulps, it forms, by its escharotic action, an eschar, which some regard as conducive to the recovery of the organ, while others prefer to use it in a diluted form, for the same object, objecting to its employment in its pure state, on account of its escharotic or caustic effect.

It is also useful as a styptic in cases of superficial hemorrhage from the gums after the extraction of teeth, especially in combination with other agents. A preparation, known as *phenol sodique*, is often employed for such a purpose.

Oil of cloves, when added to an equal quantity of carbolic acid, will disguise, to some extent, its taste and odor. It can also be perfumed by adding to 1 part of carbolic acid, 3 parts of oil of lemon, and 100 parts of alcohol (36 degrees). Carbolic acid is also employed to check the hemorrhage resulting from

the application of leeches to the mucous membrane of the mouth. When applied to an ulcerated surface, it should be repeated, as pus is formed or fungous growths appear; and, having formed an eschar when applied to an exposed pulp, it should not be repeated until the eschar is detached from the surface. It has also been employed in the form of hypodermic injections, for the relief of neuralgia.

Carbolic acid is also useful as a local anæsthetic. Combined with glycerine (1 part to 12 of glycerine), it will stimulate the mucous secretion, and hence has been applied to the palate, in cases of deficiency of this secretion, to promote the suction of upper dentures.

When properly diluted with alcohol, it renders soft and spongy gums firmer and less tender.

It will also correct fetor of the breath, arising from carious teeth, smoking, etc., acting as a deodorizer.

In all fetid discharges from the mouth, throat, etc., carbolic acid, combined with glycerine or an aqueous solution, may be used with advantage. Either pure or combined with collodion, it is employed for bathing cavities in teeth, preparatory to the introduction of the filling material, for its effect on sensitive or softened dentine and low organisms.

## DENTAL FORMULÆ.

*A Disinfectant Mouth Wash.*
DR. J. B. PATRICK.

℞. Acidi Carbolici (Cryst.)
Glycerini
Aquæ Rosæ.....āā.....℥ ij. M.

SIGNA.—Five to eight drops in a wine-glass of water.

*A Lotion for Soft and Spongy Gums.*

℞. Acidi Carbolici.....gr. xx
Spiriti Rectificati (Alcohol).....℥ ij
Aquæ Destillatæ.....℥ vj. M.

It renders the gums less tender and firmer.

*A Stimulant and Antiseptic Mouth Wash.*

℞. Acidi Carbolici.....gtt. xx
Glycerini .....℥ iv
Aquæ.....℥ x. M.

SIGNA.—To be used as a gargle.

*A Stimulant and Antiseptic Lotion.*
DR. J. STOCKEN.

℞. Acidi Carbolici.....℥ j
Glycerini .....℥ iv
Aquæ.. .....℥ x. M.

Useful in ulceration of the gums and mucous membrane.

*An Antiseptic Lotion or Injection.*

℞. Acidi Carbolici..... ʒ ss
Glycerini..... ʒ xv. M.

For alveolar abscess and ulcers of mouth. The glycerine modifies the caustic action of the acid.

*A Stimulant and Antiseptic Injection.*

℞. Acidi Carbolici..... 1 part
Glycerini.....30 parts. M.

Useful as an injection in chronic forms of alveolar abscess.

*An Antiseptic and Disinfectant Dentifrice.*

J. Stocken.

℞. Acidi Carbolici .....♏xxx
Pulveris Ossis Sepiæ... ʒ ij
Pulveris Radicis Iridis ʒ ij
Cretæ Preparatæ..... ℥ iij
Olei Caryophylli.....gtt. iij. M.

*For Odontalgia.*

℞. Collodii (Flexile)..... ʒ j
Acidi Carbolici..... ʒ ij. M.

Signa.—Apply to surface of exposed and painful pulp.

*For Odontalgia.*

℞. Acidi Carbolici..... ʒ ij
Morphinæ Acetatis.....gr. xx.

Solve. Applied to surface of exposed pulp, on cotton.

*For Odontalgia.*

℞. Acidi Carbolici
Chloroformi
Liquidi Opii
Vel Morphinæ Hydrochloratis.....āā..... ʒ ij
Tincturæ Benzoini..... ℥ j. M.

Apply to exposed surface of pulp, on cotton.

*A Stimulant and Antiseptic Lotion or Injection.*

Percy Boulton.

℞. Acidi Carbolici.....♏vj
Tincturæ Iodi.....♏xlv
Glycerini..... ʒ j
Aquæ Destillatæ..... ℥ v. M.

For inflamed mucous membrane, and an injection for chronic alveolar abscess; also useful in acute abscess after the use of more powerful escharotic and antiseptic agents.

*For Fetid Perspiration.*

℞. Acidi Carbolici.....2 parts
Glycerini .....3 parts. M.

*For Wounds and Ulcers, to Produce an Antiseptic Scab.*

℞. Melt together, with a gentle heat, Stearine, 15 parts; Rosin, 60 parts; and when the mass has somewhat cooled, but is still liquid, add 25 parts of Carbolic Acid. This mixture is then incorporated with from 700 to 800 parts of precipitated Carbonate of Calcium, and carefully reduced to a uniform powder.

*For Inhalation in Syphilitic Ulcerations.*

℞. Acidi Carbolici..... ʒ xxj
Aquæ Destillatæ..... ʒ iij. M.

Signa.—Inhale the vapor. Antiseptic.

*For Parasitic Skin Diseases.*

℞. Acidi Carbolici..... ʒ j
Glycerini..... ℥ j. M.

*For Chilblains.*

℞. Acidi Carbolici..... ʒ j
Tincturæ Iodi..... ʒ ij
Acidi Tannici..... ʒ ij
Cerat Simplicis..... ℥ iv. M.

Fiat unguentum.

*For a Carbolized Styptic.*

℞. Acidi Carbolici .....x parts
Collodii.....c parts
Acidi Tannici.....v parts
Acidi Benzoici .....v parts. M.

It coagulates blood and albumen, and cicatrizes the tissues.

*For Alveolar Pyorrhœa (Rigg's Disease).*

℞. Acidi Carbolici.....♏v
Spts. Vini Rectif..... ℥ vj
Aq. Menthæ Pip..... ℥ ij
Ol. Anisi .....♏j
Ol. Cinnamon.....♏ss. M.

SIGNA.—Apply to gum with camel's-hair brush.

*For Alveolar Pyorrhœa (Rigg's Disease).*

℞. Acidi Carbolici.....♏xxv
Potassii Iodidi.....gr. v
Zinci Chloridi.....gr. xxv
Alcohol Absolut.....♏xxv
Aq. Destillatæ.....♏x
Ol. Menthæ Pip.....♏v.

Misce et filtra.

SIGNA.—As an injection in pockets of gum.

*For Itching of the Skin.*

℞. Acidi Carbolici..... ℥ ij
Glycerini..... ℥ j
Aquæ Rosæ..... ℥ viij. M.

SIGNA.—To be applied by means of a sponge.

The following preparation is recommended for the relief of odontalgia, by Dr. K. W. Millican :—

"Melt white wax or spermaceti, two parts, and when melted add carbolic acid crystals, one part, and chloral hydrate crystals, two parts; stir well till dissolved. While still liquid, immerse thin layers of carbolized absorbent cotton-wool, and allow them to dry. When required for use a small piece may be cut off and slightly warmed, when it can be inserted into the carious cavity of the tooth, where it will solidify."

## ACIDUM CHROMICUM—CHROMIC ACID.

*Formula*, $CrO_3$.

*Derivation.* Chromic Acid is obtained in the form of brilliant, deep-red acicular crystals, by the reaction of strong sulphuric acid upon a solution of bichromate of potash. It is deliquescent, and very soluble in water and alcohol, forming an orange-yellow solution.

*Medical Properties and Action.* It is a powerful caustic, decomposing the tissues by rapid oxidation; and, although it is very slow and gradual in its action, yet it is deeply penetrating, and when action ceases, sesquioxide of chromium remains. So destructive is its effect, that small animals are

dissolved entirely, bones and all, by it, in fifteen or twenty minutes. On account of its penetrating deeply, without much pain, care is necessary in its use, and when used as a caustic, the surrounding tissues should be well protected. The part on which it acts first becomes yellow, then brown, and ultimately black, and the eschar is detached in from twenty-four to forty-eight hours. It is a powerful oxidizer, and gives up its oxygen readily to organic matter, which it thus dissolves. When in solution, more or less diluted, its action can be modified, according to the effect desired.

*Therapeutic Uses.* Chromic acid is not given internally. In the form of paste, or solution with water, it is a valuable caustic in cancerous and other ulcerations, malignant growths, hemorrhoids, warts, etc. Chromic acid has been employed with good effect in cases of secondary syphilitic deep and jagged ulcers of the tongue, and ulceration of inside of the cheek, mucous tubercles and condylomata. It has also been employed in the treatment of granular ophthalmia, uterine hemorrhage, uterine catarrh, etc. It causes less pain than nitric acid and other caustics, but should never be applied to a surface to be cauterized in a layer deeper than a line in thickness. For the removal of warts, etc., it is employed in a solution of 100 grains to the ounce of distilled water.

*Dental Uses.* In dental practice chromic acid has been employed for obtunding sensitive dentine, and for bleaching necrosed teeth; but its most valuable application is for the removal of tumors and morbid growths upon the gums, fungous growths of tooth pulp, etc. When applied to any part of the mouth, the surrounding parts should be carefully protected by folds of lint or strips of adhesive plaster. A glass rod, or a gold or platinum wire should be used for its application. It is also useful in ulceration and recession of the gums, beginning the treatment with a weak solution, and gradually increasing the strength. It is sometimes combined with glycerine, in which case the latter must be added to the acid, drop by drop, in order to avoid explosion.

DENTAL FORMULA.

*For Secondary Syphilitic Ulcers, and Ulcerations of Mucous Membrane of Mouth and Tongue.*

℞. Acidi Chromici.....gr. x
Aquæ..... ℥j.
Misce Solut.

SIGNA.—Paint the diseased parts 3 or 4 times a day with a camel's-hair brush dipped in the solution.

## ACIDUM GALLICUM—GALLIC ACID.

*Formula.* $C_7H_6O_5$.

*Derivation.* Gallic Acid is obtained from galls by exposing the powder in water to the action of the air, at a temperature of between 60° and 70° F., when the acid is deposited in the form of small, silky, almost colorless crystals, possessing a slightly acid and astringent taste. Gallic acid is slightly soluble in cold water, and freely soluble in hot water, glycerine or alcohol.

GALLS, from which gallic acid is prepared, are the excrescences caused by the punctures and deposited ova of a hymenopterous insect on the twigs of the gall oak (*Quercus Infectoria*).

*Source.* Galls are obtained from Asia Minor and Persia.

*Medical Properties and Actions of Galls.* Powerfully astringent, this property depending upon the presence of tannic and gallic acids, as they contain 35 per cent. of tannic and 5 per cent. of gallic acids. The powder, which is obtained from the small, round, dark-blue or lead-colored excrescences, is of a light yellowish-gray color, inodorous and of a bitter taste.

Galls are used in various forms, such as powder, tincture, infusion, ointment, etc.

*Therapeutic Uses.* Galls are employed in the treatment of chronic diarrhœa, dysentery, leucorrhœa, chronic gonorrhœa and gleet, disease of the uterus and intermittent fevers, and externally in hemorrhagic disorders, hemorrhoids, relaxation o uvula, hypertrophy of the tonsils, etc.

*Dose.* Of Powdered Galls, gr. x to gr. xx. The ointment

is composed of: Powdered Galls, gr. lxxx; benzoated lard, ℥j. It is combined with opium in the proportion of Ointment of Galls, ℥j; Powdered Opium, gr. xxxij.

*Medical Properties and Actions.* Gallic acid is a powerful astringent for arresting hemorrhage, in which the bleeding vessels must be reached through the circulation. It is also a valuable styptic in cases of hemorrhage depending on a hemorrhagic diathesis, and in the form of a gargle it is very serviceable in acute inflammations of mucous membranes. It is also a strongly deoxidizing agent; and, like tannic acid, it is capable of taking oxygen from the globules. Internally employed it produces constipation, which may be prevented by an occasional aperient. Although it is weaker than tannic acid, yet its properties are very similar. It is supposed to be converted into tannic acid in the blood.

*Therapeutic Uses.* Gallic acid is employed in the treatment of hemorrhagic diseases, in their chronic stages especially, such as hæmoptysis, hemorrhage from ulcer of the stomach, hæmatemesis and hæmaturia, atonic menorrhagia; also, for the profuse perspirations and excessive expectoration of phthisis, albuminuria, dyspepsia, chronic diarrhœa and gastric irritation in children, gonorrhœa, gleet, etc.

*Dose.* Of Gallic Acid, gr. ij to gr. v, in pill, every two or three hours.

Glycerite of Gallic Acid (*Glyceritum Acidi Gallici*), for external use, is composed of Gallic Acid, ℥j; Glycerine, ℥iv.

Ointment of Galls (*Unguentum Gallæ*), is composed of Galls in fine powder, ℥j; lard, 420 grains.

*Dental Uses.* Powdered galls is useful as a styptic in superficial hemorrhages from the gums and mucous membrane; also in inflamed and ulcerated conditions of mucous membrane, and in relaxation of the uvula. Gallic acid, in the form of a gargle, is employed in acute inflammations of mucous membrane, as astringent and antiseptic, and in hemorrhages from mucous surfaces depending upon a hemorrhagic diathesis.

DENTAL FORMULÆ.

*For an Astringent Gargle or Lotion.*

℞. Pulveris Gallæ..... ℥ ss
Aquæ.....Oj. M.

SIGNA.—As a gargle or lotion in inflamed or ulcerated conditions of mucous membrane and gums.

*For Relaxation of Uvula and Hypertrophy of Tonsils.*

℞. Infusi Gallæ..... ℥ vj
Aluminis.....gr. xl. M.

SIGNA.—Use as a gargle.

*For Acute Tonsillitis and Inflammation of Mucous Membrane of the Mouth.*

℞. Acidi Gallici.....gr. xl
Liq. Sodæ Chlorinatæ.. ℥ ij
Glycerini..... ℥ ij
Aquæ Destillatæ..... ℥ viij. M.

SIGNA.—To be used as an antiseptic and astringent gargle.

*An Internal Astringent in Hemorrhagic Affections.*

℞. Acidi Gallici..... ℥ j
Glycerini ..... ℥ iv
Aquæ Destillatæ ..... ℥ vj. M.

SIGNA.—Take ℥ j as a dose.

## ACIDUM HYDROCHLORICUM—HYDROCHLORIC ACID.

### MURIATIC ACID—ACIDUM MURIATICUM.

*Formula.* HCl. Sp. gr. 1.16.

*Derivation.* Hydrochloric or muriatic acid is obtained by the action of sulphuric acid on a solution of chloride of sodium or common salt. When pure, it is a transparent, colorless liquid, but when contaminated with chlorine, iron and other substances, it has a yellow color. It emits a dense, white vapor, with a pungent odor and a corrosive taste, being an active poison. The antidote is magnesia or soap.

*Medical Properties and Actions.* The strong acid is a powerful caustic and escharotic; also disinfectant and fumigant, but inferior in its disinfectant properties to those of chlorine. For internal use the dilute acid, which is tonic, refrigerant and astringent, is employed, acidum hydrochlorium dilutum—diluted hydrochloric acid, which is prepared by diluting the strong acid so that four ounces of the acid are contained in a pint of diluted acid. It is of a deep yellow color, and emits the odor of chlorine, which is its principal constituent.

*Therapeutic Uses.* The dilute hydrochloric acid is internally employed in the treatment of calculous affections, gout, atonic dyspepsia, typhus and typhoid fevers, continued fevers

of childhood, syphilis, chronic whooping cough, phthisis, etc., and externally in diphtheria, ulcerated sore throat, cynanche maligna, etc.

*Dose.* Of Dilute Hydrochloric Acid, ♏x to ♏xxx, freely diluted; otherwise, when swallowed, it is highly irritant and corrosive.

*Dental Uses.* The strong acid is employed in the dental laboratory for dissolving zinc, in the preparation of a flux for soldering certain metals.

The strong acid is also employed as a local application, in gangrenous stomatitis or cancrum oris, for arresting the ulcerative process; but care is necessary in its use, on account of its powerful action, in order to limit its application to the parts on which it is to act. In mild cases it should be diluted with an equal weight of honey.

In aphthous ulcerations of the mouth in children it is often a useful application.

### DENTAL FORMULÆ.

*For Aphthæ.*

℞. Acidi Hydrochlorici...1 part
Mellis .....8 parts. M.
SIGNA.—Apply with a camel-hair pencil.

*For Ulcerations of Mucous Membrane.*

℞. Acidi Hydrochlorici Diluti ..... ℥ ij
Glycerini ..... ℥ iv
Aquæ Destillatæ..... ℥ x. M.
SIGNA.—To be used as a gargle.

*For Chronic Inflammation of Mucous Membrane and Gums.*

℞. Acidi Hydrochlorici Dilut.....♏x
Infusi Cinchonæ.....f ℥ iv
Mellis..... .....f ℥ j. M.
Fiat gargarysma.

*For Scorbutic Gums.*

℞. Acidi Hydrochlorici Dilut..... .....℥ ss
Mellis
Aquæ Rosæ .....āā.....f ℥ j. M.
SIGNA.—Apply with a camel-hair pencil three or four times a day.

## ACIDUM NITRICUM—NITRIC ACID.

### AQUA FORTIS.

*Formula.* $HNO_3$. Sp. gr. 1.420.

*Derivation.* Nitric acid is obtained by the action of sulphuric acid upon nitrate of potash or soda. When strong and pure it is colorless, but on account of the presence of nitric

peroxide it is generally of a yellow color, and emits acrid corrosive fumes.

*Medical Properties and Action.* Pure nitric acid is a powerful caustic and escharotic, and leaves a permanent stain on the cuticle. It is not employed in its concentrated form internally, but externally, as an escharotic to destroy warts and stimulate sluggish sinuses; in a diluted form it is employed as an astringent wash or gargle. The antidotes in cases of poisoning are magnesia or soap, and mucilaginous drinks.

*Therapeutic Uses.* The strong acid is employed externally in hospital gangrene and phagedenic ulcerations; hemorrhoids and painful hemorrhoidal tumors, syphilitic condylomata, syphilitic sore throat, malignant ulcers, obstinate skin diseases, etc.

DILUTED NITRIC ACID—*Acidum Nitricum Dilutum*, contains three ounces of acid in a pint of the diluted acid.

*Medical Properties and Action.* It is an antalkaline, alterative, tonic and refrigerant, and has a very direct action on the liver, and if its use is continued for a long time it causes salivation. Like all mineral acids, it injures the teeth; hence, proper care should be taken to prevent such action—such as the use of alkaline gargles before and after taking the acid into the mouth, which should be done through a glass tube or quill. As a tonic it is advantageously employed during convalescence after inflammation, and in cachexia following acute disease or habits of intemperance. It is also employed as an alterative after the long use of mercury, as it increases the strength and improves the tone of the system. It is also valuable as a disinfectant, but inferior to chlorine. It is not as agreeable to the stomach as diluted sulphuric acid.

*Therapeutic Uses.* Dilute nitric acid is employed in the treatment of calculous disease, syphilis, chronic hepatitis, chronic diarrhœa, constipation, chronic affections of the spleen, chronic rheumatism, cardialgia, whooping cough, intermittent fevers, etc.

*Dose.* Of diluted nitric acid, gtt. ij–xv, three times a day, diluted with water.

*Dental Uses.* The strong acid when mixed with two parts of hydrochloric acid, is a solvent for gold, and is known as *aqua regia.* It is also employed as one of the most effectual caustics in cancrum oris, the constitution being supported and quinine given at the same time; also for malignant ulcers of the mouth, and for devitalizing pulps of teeth when nearly exposed by mechanical abrasion, care being observed that the part of the surface immediately over the pulp is touched with the acid, and the neighboring parts protected.

DENTAL FORMULA.

*For Sloughing and Ill-Conditioned Ulcers.*

℞. Acidi Nitrici.....♏l-lx
Aquæ.....Oj. M.

SIGNA.—Apply with a camel-hair brush.

## ACIDUM PHOSPHORICUM—PHOSPHORIC ACID.

ACIDUM PHOSPHORICUM DILUTUM—*Diluted Phosphoric Acid,* is the principal form in which phosphoric acid is employed in medicine.

*Formula.* $H_3PO_4$. Sp. gr. 1.056.

*Derivation.* Phosphorus, a non-metallic element, obtained from bones, is a translucent, nearly colorless, wax-like solid, without taste, and emitting white vapors when exposed to the air. Sp. gr. 1.8.

It is insoluble in water, but soluble in ether and in hot oil of turpentine, and has a peculiar smell. It is nervine, tonic and stimulant, and, in over-doses, poisonous. The vapor is irritating to the conjunctiva and bronchial mucous membrane.

*Derivation. Diluted Phosphoric Acid* is prepared by boiling phosphorus with nitric acid and distilled water until it is dissolved, evaporating and re-diluting it. It may also be obtained by dissolving an ounce of glacial phosphoric acid in three ounces of distilled water, afterwards adding forty grains of nitric acid, boiling to a syrup, and diluting with water until the solution measures twelve and a half ounces.

*Medical Properties and Action.* It is tonic and refrigerant, and, in large doses, is a powerful stimulant of the nervous and

vascular systems. It can be detected in the blood, owing to its absorption, and, in large doses, is an irritant poison.

*Therapeutic Uses.* Diluted phosphoric acid is employed in scrofula, dropsy, hæmoptysis, calculous disease, diabetes and cardialgia. Externally, it has been employed as a local application in the treatment of caries of the bones and osseous tumors.

*Dose.* Of diluted phosphoric acid gtt. ij–xv, diluted in sugar and water.

*Dental Uses.* As a local application in the treatment of caries of the maxillary bones and osseous tumors of the jaws. Internally, it has been administered with a view of supplying a deficiency of phosphoric acid in the teeth. (See *Hypophosphites of Lime.*)

DENTAL FORMULÆ.

*For Caries of the Maxillary Bones and for Osseous Tumors of the Jaw.*

℞. Acidi Phosphor. Dilut..1 part
Aquæ Destillatæ..8 to 10 parts. M.
SIGNA.—Apply as a lotion or injection.

*For Ulcers over Carious Bones.*

℞. Acidi Phosphorici
Glacialis.....ʒj
Aquæ Destillatæ .....fʒviij.
Fiat solutio.
SIGNA.—To be applied on compresses to ulcers situated over carious bones.

PHOSPHORIC ACID IN THE ANHYDROUS STATE consists of one equivalent of phosphorus to five equivalents of oxygen ($PO_5$), and is obtained by the direct union of its constituents, which takes place when phosphorus is burned in perfectly dry oxygen gas.

Thus procured, it is in the form of a white amorphous powder, extremely deliquescent, volatilizable at a red heat, and assumes, when it cools, after fusion, a vitreous appearance.

*Glacial Phosphoric Acid,* or monohydrated phosphoric acid, is readily obtained from calcined bones, by first treating them with sulphuric acid, which produces an insoluble superphosphate of lime; then dissolving out the latter salt, and saturating it with carbonate of ammonia, which generates phosphate of ammonia in solution, and finally obtaining the phosphate of

ammonia by evaporating to dryness, and then igniting it in a platinum crucible. The ammonia and all of the water, except one equivalent for each equivalent of the acid, are driven off, and the glacial phosphoric acid remains, the formula of which is $HO,PO_5$, and contains 11.2 per cent. of water. It is a white, transparent, fusible solid, generally in the form of sticks, inodorous and sour to the taste. It slowly deliquesces, and is sparingly soluble in water, but freely soluble in alcohol.

*Dental Uses.* Glacial phosphoric acid and white oxide of zinc formed into an anhydrate give the plastic material for filling teeth known as oxy-phosphate of zinc. The powder or solid portion of this preparation is prepared by packing pure oxide of zinc in a clay crucible and subjecting it to almost a white heat for two hours, when it will have been reduced in bulk fifty per cent. It is then pulverized in a mortar, to an almost impalpable powder. The burning of the oxide of zinc colors it to a light yellow, and it is now in a condition for use, and may be kept in a covered vessel for any length of time.

The liquid portion of this filling material being glacial phosphoric acid, it is dissolved in pure water until a saturated solution is obtained, when it is reduced by boiling in a glass vessel until it is of the consistency of glycerine, in which operation it loses one-third in bulk. It is now ready for use, and must be kept in a close glass-stoppered bottle.

Formula for Fletcher's and Weston's preparations of oxy-phosphate of zinc filling materials :

FLETCHER'S.

| *Fluid.* | *Solid.* |
|---|---|
| Phosphoric Acid. | Basic Oxide of Zinc. |
| Phosphate of Alumina. | |

WESTON'S

| *Fluid.* | *Solid.* |
|---|---|
| Phosphoric Acid. | Basic Oxide of Zinc—80 per cent. |
| (See *Oxide of Zinc*). | Silicate of Alumina—20 " " |

## ACIDUM SALICYLICUM—SALICYLIC ACID.

*Formula.* $HC_7H_5O_3$ or $C_6H_4\{^{OH}_{COOH}\}$.

*Derivation.* Salicylic acid is obtained by combining carbolic acid with caustic soda, and subjecting this compound to dry carbonic acid under the influence of heat, the portion of salicylate of sodium remaining behind after the carbolic acid distills over, being saturated, in the form of a hot aqueous solution, with muriatic acid, which liberates the salicylic acid in small crystals. The crystals are washed, dissolved in hot water, and by re-crystallization, obtained in the form of a powder of a light brown color, which is then bleached until it is quite white; but most of that sold is of a light cream color, with a reddish tinge. The coloring matter, however, which is present, does not interfere with its efficacy. It has no smell, a slight taste, and is soluble in alcohol and ether and in hot water and glycerine. It can also be obtained from salicin, the vegetable principle existing in willow, poplar, etc., and from oil of gaultheria (winter green), and from spiræa ulmariæ (meadow sweet).

*Medical Properties and Action.* Salicylic acid is a powerful antiseptic, and is said to be far more effective in smaller quantities than any other antiseptic, in arresting the putrefactive and fermentative processes. When properly reduced in strength, it causes no pain or irritation in the parts to which it is applied. It will destroy minute organisms, and a small quantity will arrest vinous fermentation and prevent the decomposition of animal fluids. Although free from any poisonous action when administered in a reasonable quantity, yet, in large doses, it will cause nausea and vomiting. It is thought to combine with the soda of the blood, where it is present as a salicylate. It has little or no affinity for cold water, but the addition of certain alkaline salts, such as sodium phosphate, increases its solubility. Combined with sulphite of sodium, which is also antiseptic, and water, a solution is formed which is free from irritating properties, and especially applicable to the treatment of zymotic diseases. Glycerine warmed will dissolve $\frac{1}{10}$ of

its weight of salicylic acid, and the solution may then be diluted with water to any desirable extent.

*Therapeutic Uses.* It is employed in fevers as an antipyretic or febrifuge; also for the same purpose in acute rheumatism, pneumonia, phthisis, diphtheria, etc. Externally it is employed as a disinfectant and deodorizer, many preferring it, on account of its freedom from odor, to carbolic acid. It is also employed as a local application in eczema of the head and face, syphilitic ulcers, and to cancer, gangrenous and sloughing wounds, in the form of powder, and as an ointment for burns.

*Dose.* Of salicylic acid, gr. x to gr. xx or xxx.

*Dental Uses.* Salicylic acid is employed in the treatment of suppurating and gangrenous pulps of teeth, in the form of the dry powder introduced into the pulp canals and permitted to remain for several days. An ethereal solution of salicylic acid introduced on a small piece of spunk, has also been employed for the same purpose, where it is difficult to introduce the dry powder; the ether volatilizes in a few minutes. Salicylic acid is also employed with advantage in inflamed conditions of the mucous membrane of the mouth and gums, and in the treatment of aphthæ, thrush and other ulcers, in the form of a solution. For such purposes its combination with powdered cassia or cinnamon, equal parts, is recommended, to be applied with a soft brush. Salicylic acid has also been found efficacious in all inflammatory conditions resulting from decayed and dead teeth and roots. It has also been recommended as a dentifrice in the form of an alcoholic solution of the acid perfumed with oil of gaultheria, but its use for such a purpose is questioned, on account of its softening effect upon the tooth structure. As tannic acid interferes with the action of salicylic acid, these agents should not be used in combination.

## DENTAL FORMULÆ.

*A Disinfectant Mouth Wash.*

℞. Acidi Salicylici..... 1 part
Sodii Phosphate..... 3 parts
Aquæ Destillatæ.....30 parts. M.

SIGNA.—Use as a gargle.

*A Disinfectant and Stimulaut Mouth Wash.*

℞. Acidi Salicylici..... ʒ ij
Spiriti Vini Rectificati ʒ x. M.

SIGNA.—Use as a gargle.

*For Perspiration of Hands and Feet.*

℞. Acidi Salicylici..... 3 parts
Magnesii Silicat.....87 parts. M.

SIGNA—Use in the form of a powder.

*For Burns.*

℞. Acidi Salicylici.....ʒj
Olei Olivæ.....ʒviij. M.

SIGNA.—Apply as a lotion.

*An Emollient and Antiseptic Gargle.*

℞. Acidi Salicylici.....ʒij
Sodii Boratis.....ʒiij
Glycerini.....ʒijss
Aquæ Destillatæ.....ʒiij. M.

SIGNA.—Add one or two drachms to half a pint of warm water.

## ACIDUM SULPHURICUM—SULPHURIC ACID.

### OIL OF VITRIOL.

*Formula.* $H_2SO_4$. Sp. gr. 1.843.

*Derivation.* Sulphuric acid is obtained by burning sulphur, mixed with one-eighth of its weight of nitre, over a stratum of water contained in a chamber lined with lead. It is a dense, colorless liquid, inodorous, with an acrid taste, oily consistence and very corrosive. On the addition of water, with which it unites in all proportions, there is an evolution of heat. In the concentrated form it is only used externally as a caustic. Being an acrid, corrosive poison, it causes death from asphyxia. The antidote is magnesia or chalk, or solution of soap, and mucilaginous drinks freely administered.

*Medical Properties and Action.* It is a powerful escharotic, and when applied to living tissue, the parts first become white, and subsequently a brownish black color. It is not used internally, on account of its corrosive action. It is considered to be one of the most effective caustics in the bites of rabid animals.

DILUTED SULPHURIC ACID—*Acidum Sulphuricum Dilutum.*

*Derivation.* It is prepared by diluting sulphuric acid fʒvij with distilled water fʒlxxvij, and when the mixture has cooled to 60°, adding more water ʒlxxxiiiss. Sp. gr. 1.094.

*Medical Properties and Action.* It is refrigerant, astringent and tonic. It is employed as a refrigerant in fevers; as an astringent for arresting hemorrhage and passive mucous discharges; and as a tonic to improve digestion. As it is very in-

jurious to the teeth, the proper precautions should be observed, as in the case of all acids administered as medicines—such as alkaline gargles used before as well as after their introduction into the mouth, and the use of a glass tube or quill.

*Therapeutic Uses.* Diluted sulphuric acid is employed as an internal remedy in hemorrhage from the lungs, bowels and uterus, in calculous affections, certain skin diseases, diarrhœa, profuse perspiration of phthisis, in the advanced stages of typhus and typhoid fevers, scarlatina, lead poisoning, etc. Externally, as a gargle and wash to ulcers.

*Dose.* Of diluted sulphuric acid, ♏v to ♏xx., three times a day in water.

Aromatic Sulphuric Acid—*Acidum Sulphuricum Aromaticum—Elixir of Vitriol.*

*Derivation.* Aromatic sulphuric acid is prepared by mixing sulphuric acid, f℥iij, with rectified spirit, Oij, and adding cinnamon, ℥ij, and ginger, ℥j¼. It is a reddish-brown liquid, with an aromatic odor and a pleasant taste.

*Medical Properties and Action.* It is tonic and astringent, and is the most agreeable form of sulphuric acid for internal use.

*Therapeutic Uses.* Aromatic sulphuric acid is employed as a substitute for the diluted form in debility with night sweats, loss of appetite during convalescence from fevers, hæmoptysis and other hemorrhages and epidemic dysentery. Externally, it is applied to carious bone, ulcers, etc.

*Dose.* Of aromatic sulphuric acid, ♏v to ♏xxx, three times a day, in water.

*Dental Uses of the Different Forms of Sulphuric Acid.* The concentrated sulphuric acid is employed as a caustic in malignant ulcers, cancrum oris, gangrene, etc., in the form of a paste, made by mixing it with powdered sulphate of zinc. The concentrated sulphuric acid is also used in the dental laboratory, to cleanse metal plates, preparatory to and after soldering, for which purpose it is generally diluted with one-third of water, its action being greater when it is in a warm state. The concentrated acid is also used in combination with nitric acid,

to reduce hemp paper to pyroxylin, in the preparation of the celluloid base.

The aromatic sulphuric acid is similar in its action to the diluted form, and is more agreeable for use about the mouth.

It is a valuable application in pyorrhœa alveolaris (Riggs' disease), and in caries and necrosis of the maxillary bones, as an injection or lotion, as it stimulates the parts to healthy action by favoring granulation. It may be applied to parts about the teeth, in cases of recession of the gums and absorption of the processes, on a properly-shaped piece of orange wood. It is also valuable in alveolar abscesses as an injection, especially in sluggish cases, when the addition of a few drops of tincture of capsicum will prove serviceable. It has the power of dissolving the thin carious portions of the bones, such as the margins of the alveolar cavities, and can be applied on cotton saturated with it and permitted to remain for several hours, when the parts should be perfectly cleansed with warm water. It is also employed as a gargle, properly diluted, in mercurial inflammation of the mouth and other forms of stomatitis, which do not yield to the influence of milder astringent washes. It is also employed in the treatment of aphthæ and other ulcers of the mouth.

### DENTAL FORMULÆ.

*For Mercurial and Ulcerative Stomatitis.*
THOMAS.

℞. Acidi Sulphurici.....♏x
Decocti Hordei.....f℥iv
Mellis.....f℥ss. M.
SIGNA.—Use as a gargle.

*For Aphthæ and other Ulcers of Mucous Membrane and Gums.*

℞. Acidi Sulphurici.....f℥ss
Mellis.....f℥j. M.
SIGNA.—To be applied with a camel-hair brush.

*For Carious Bone, Rigg's Disease, etc.*

℞. Acidi Sulphurici Aromat.....f℥iij
Tinctura Capsici..... gtt. x
Aquæ.....f℥ij. M.
SIGNA.—To be used as an injection or lotion.

## ACIDUM TANNICUM—TANNIC ACID.

### Tannin.

*Formula.* $C_{27}H_{22}O_{17}$.

*Derivation.* Tannic acid is obtained by exposing powdered galls to a damp atmosphere for several days, when sufficient ether is added to form a soft paste, which is allowed to stand for twenty-four hours. It is then subjected to pressure as quickly as possible, and the mass again treated with ether, to which $\frac{1}{5}$ of its bulk of water has been added; this is allowed to stand as before, and is again subjected to pressure. The expressed liquids are now combined and allowed to evaporate spontaneously; then, by the aid of a little heat, brought to a syrupy consistence, when it is dried on plates in a hot air chamber, at a temperature not exceeding 212° F. Pure tannic acid is solid, uncrystallizable, either white or slightly yellowish, inodorous, astringent to the taste, but without bitterness, and with an acid reaction. It is obtained in the form of vesicular masses, or thin, glistening scales, or in the shape of fine threads of a pseudo-crystalline appearance. Tannic acid exists also in rhatany, catechu, and other vegetable astringents, as it is their chief principle.

*Medical Properties and Actions.* Tannic acid is considered to be the most active of all vegetable astringents and styptics, and especially powerful on albumen, gelatin and fibrin. It is very soluble in water, and less so in alcohol and ether. Taken internally, it produces no nausea, is perfectly safe, and its use may be continued for a long time without any ill effects. It may also be administered before and after meals, at all times, and be combined with many other remedies, such as iron, cod-liver oil, bitters, etc. Like gallic acid, it is capable of taking oxygen even from the blood globules, when in contact with alkalies.

Tannic acid unites with albumen, fibrin and gelatin, forming insoluble tannates, thus preserving the parts beneath from the influence of irritating agents until resolution occurs.

Its solution reddens litmus paper, and it is decomposed and entirely dissipated when thrown upon red-hot iron.

*Therapeutic Uses.* Internally it is administered in hemorrhages of the lungs, stomach, kidneys or uterus, chronic bronchial catarrh, phthisis, after softening has taken place, intermittent fever, whooping cough, chronic diarrhœa, diseases of the genito-urinary organs, dyspepsia, diphtheria, nervous diseases, etc. Externally it is applied in hemorrhages and profuse secretions, mercurial salivation, diseases of the eye, nasal polypus, gonorrhœa and gleet, bed sores, relaxation of uvula, skin diseases, ulcers, etc.

*Dose.* Of tannic acid, gr. j to ℈j, in pill.

*Dental Uses.* In dental practice tannic acid is a valuable agent for local use in the treatment of such diseases as mercurial stomatitis, ulceration of the gums and mucous membrane of the mouth, hypertrophy of the gums, hemorrhage following the extraction of teeth and wounds of mucous membrane, fungous growth of pulp, sensitive dentine, sponginess of the gums, for the temporary relief of odontalgia, disease of the antrum. In mercurial salivation tannic acid in the form of powder, moistened with water, will render the spongy gums firmer and more comfortable, causing contraction of the vessels and checking a tendency to absorption and the consequent loosening of the teeth. A strong solution of tannin in alcohol is beneficial in obtunding the sensitiveness of dentine, or the tannin may be, in the form of a powder, combined with morphia and creasote. Tannic acid in the form of a paste or ointment, made by rubbing two scruples of tannin with twenty drops of glycerine, and then with an ounce of lard, makes a good astringent application. A gargle, composed of tannic acid and glycerine, is a useful application for abrasions caused by artificial teeth and other irritants. A preparation known as *Elixir of Vitriol and Tannin*, saturated solution, is a powerful astringent and hæmostatic when applied to bleeding surfaces, fungous growths, etc.

An English preparation, known as *Styptic Colloid*, is a saturated solution of tannin and gun cotton, and is highly recommended for its styptic and deodorizing properties, as it solidifies blood and albumen by mere contact, and can be

applied directly by means of a camel-hair brush, or, mixed with an equal quantity of ether, in the form of spray. No irritation follows its use, and for hemorrhage from the extraction of teeth, or in the treatment of necrosed or carious maxillary bones, it is very efficient. Cold or warm water will not dissolve it, but an ether and alcohol solution may be used to remove the dressing.

A styptic and antiseptic cotton can be prepared by saturating purified cotton with tannic acid, 5 parts; carbolic acid, 4 parts; alcohol, 50 parts. The cotton should be dried and preserved air-tight.

Glycerite of Tannic Acid—*Glyceritum Acidi Tannici*, for external use, is made of Tannin, ℥ij; Glycerine, ℥viij.

Ointment of Tannic Acid—*Unguentum Acidi Tannici*, is made of Tannin, ℥j; Lard, ℥j. Useful for a local application to ulcers.

## DENTAL FORMULÆ.

*For Odontalgia.*

DRUITT.

℞. Acidi Tannici.....gr. xx
Gum Mastich.....gr. x
Spt. Æther Sulph.....f ℥ss. M.

SIGNA.—To be applied to carious cavity, on a pellet of cotton.

*For Inflamed and Ulcerated Mucous Membrane.*

℞. Acidi Tannici.....℥ss
Spiriti Vini Rectificati..℥ss
Aquæ Camphoræ.....f ℥v. M.

SIGNA.—To be used as a gargle.

*For Inflamed and Ulcerated Gums.*

℞. Acidi Tannici.....℥iv
Glycerini .....℥ij. M.

SIGNA.—To be used as a gargle or mouth-wash.

*For Inflamed Mucous Membrane, Abrasions, Ulcers and Sensitive Dentine.*

℞. Acidi Tannici.....℥ij
Tincturæ Arnicæ .....℥ij
Tincturæ Myrrhæ.....℥j. M.

SIGNA.—To be used as a lotion.

*For Same as Above.*

℞. Acidi Tannici.....℥j to ℥ij
Spiriti Rectificati.....℥j
Aquæ Destillatæ.....℥x. M.

SIGNA.—To be used as a gargle.

*For Same as Above.*

℞. Acidi Tannici.....ʒij
Pulveris Aluminis..... gr. xxx
Aquæ Destillatæ.....℥v. M.

SIGNA.—To be used as a gargle.

*For an Astringent Dentifrice.*

℞. Acidi Tannici .....gr. xxx
Cretæ Preparatæ.....℥ij
Pulveris Ossis Sepiæ...℥ij
Olei Caryophylli.....gtt. iij. M.

*For an Astringent Mouth-Wash in Inflamed and Ulcerative Conditions of Gum and Mucous Membrane.*

℞. Acidi Tannici.....gr. xx
Tincturæ Pyrethri..... ʒ iij
Aquæ Rosæ..... ℥ vj. M.
SIGNA.—To be used as a gargle.

*For Inflamed Mucous Membrane of Mouth and Fauces.*

℞. Acidi Tannici..... ʒ j
Tincturæ Myrrhæ..... ʒ iij
Pulv. Acaciæ..... ʒ ij
Glycerini..... ℥ ij
Aq. Destil. q.s. ad..... ℥ vj. M.
SIGNA.—Use as a gargle.

*For Chronic Ulcers and Abscesses.*

BERAL.

℞. Acidi Tannici.....gr. xxxij
Aquæ Destillatæ.....f ℥ viij. M.
SIGNA.—To be used as a lotion.

*For Ulcerations and Abrasions.*

℞. Acidi Tannici .....gr. xv
Glycerini .....f ℥ j. M.
SIGNA.—To be used as a lotion.

*For Alveolar Hemorrhage.*

℞. Acidi Tannici.....gr. xl
Liq. Plumb. Subacet.
Dilut.....f ℥ iss
Vin. Opii.....f ℥ ss M.
SIGNA.—Apply on cotton or lint, or as an injection.

*For Inflamed Mucous Membrane of Mouth.*

℞. Acidi Tannici..... ʒ ss
Sodii Boratis..... ʒ iij
Glycerini..... ℥ ij
Aquæ Destillatæ..... ℥ iv. M.
SIGNA.—Use as a gargle.

## ACIDUM TARTARICUM—TARTARIC ACID.

*Formula.* $H_2C_4H_4O_6$.

*Derivation.* Tartaric acid is obtained from "tartar" (a peculiar substance which concretes on the inside of wine casks, being deposited during the process of fermentation), or from crude cream of tartar.

It is in the form of white or colorless crystals, irregular six-sided prisms, and is soluble in water and alcohol, and wholly dissipated by heat.

*Medical Properties and Action.* It is refrigerant, and dissolved in water and sweetened, is a good substitute for lemonade.

In large doses it is an irritant poison, and when its internal use is followed by a red and dry tongue, it should be discontinued. It is often administered in the form of effervescing powders.

*Therapeutic Uses.* Internally it is employed as a refrigerant, in inflammatory and febrile diseases, irritability of the stomach,

nausea and vomiting, dyspepsia, and diseases attended with copious secretion of mucus, dysentery, etc., etc.

*Dose.* Of tartaric acid, gr. x to gr. xx, dissolved in water and sweetened.

*Dental Uses.* In combination with an equal quantity of chloride of lime, it is employed for bleaching discolored teeth.

## ACONITUM—ACONITE.

### Wolfsbane, Monkhood.

*Source.* Aconite is obtained from the dried, tuberous root of *Aconitum Napellus*, a perennial plant abounding in the mountains of Europe and Asia. The leaves and root are both used, but the latter is the most powerful. The alkaloid *Aconitia*, a sedative poison, too powerful for internal use, is obtained from the root, and is externally employed for neuralgic affections, producing a sensation of heat and pricking, succeeded by a feeling of numbness and constriction in the part on which it is rubbed.

*Medical Properties and Action.* Aconite is a powerful sedative to the nervous system, and reduces the force of the circulation. In large doses it is an active poison, lessening the heart's action, affecting its ganglia and muscle, and paralyzing the muscles of respiration. In moderate doses it produces warmth in the stomach, general warmth of the body, and sometimes nausea, numbness and tingling in the lips and fingers, muscular weakness, diminished force and frequency of the pulse, and diminished respiration. It proves fatal, in poisonous doses, by its powerfully sedative impression on the nervous system, by suspension of the respiratory function, and by syncope.

*Therapeutic Uses.* Aconite, in the form of an extract prepared from the leaves, and a tincture prepared from the root, is administered in all inflammatory and febrile affections, acute rheumatism, neuralgia, especially in chronic cases of neuralgia, where all the signs of active disease are absent, or have been relieved by other remedies; tetanus, sciatica, diseases of the heart, erysipelas, amenorrhœa, tonsillitis, acute congestion of

liver, peritonitis, eruptive fevers, etc., etc. It is contra-indicated in inflammatory conditions of the gastro-intestinal mucous membrane. It is locally applied to painful sprains and bruises, and chronic arthritic swellings.

*Dose.* Of the tincture of Aconite—*Tinctura Aconiti*—gtt. j to gtt. v; of the Extract of Aconite—*Extractum Aconiti*—gr. j to gr. ij. The tincture of the root is composed of twelve troy-ounces to alcohol Oij.

*Dental Uses.* Aconite in the form of the tincture is a valuable agent in dental practice. When locally applied it subdues inflammation in its early stages, by paralyzing the nerves of the part and lessening the incitement to the local afflux of blood, favoring resolution and limiting the extent of an abscess where pus is already formed. Combined with an equal part of the tincture of iodine, it is a valuable application in the incipient stages of dental periostitis. For such a purpose the gum over the root of the affected tooth should be painted with this combination until it assumes a dark brown color, taking the precaution to first remove all moisture from the surface to which it is to be applied, and after its application, protecting the adjoining parts, such as the lips or cheeks, until the remedy is absorbed. A drop or two of the tincture introduced into the cavity of an aching tooth will relieve odontalgia; and the same quantity will subdue the pain which follows the extraction of a tooth, especially when the cause has been the inflammation of the dental periosteum. Tincture of aconite is also serviceable in the conservative treatment of irritated or inflamed pulps of teeth. Combined with an equal quantity of chloroform, it is applied as a local anæsthetic for the extraction of teeth. For the same purpose it is combined with chloral, pyrethrum, morphia, etc. (See Dental Formula.) It is also a useful dressing for the pulp canals of teeth, preventing the formation of inflammatory products. The alkaloid, *aconitia*, is a useful remedy in neuralgia of the fifth pair of nerves. (See Dental Formula.) Care is necessary in the application of the tincture of aconite to large surfaces, or where the skin is abraded, as dangerous constitutional effects may result. Fifteen drops

of the tincture taken internally have caused death. The symptoms of poisoning by aconite are as follows: Overpowering sense of fatigue in the lower extremities, great muscular weakness, dimness of vision, with dilated pupils; great dyspnœa, the respirations being short and labored; the pulse at first slow and small, and afterward imperceptible; surface of body, tongue and breath cold; a profuse perspiration; muscles of respiration paralyzed; ceasing of the heart's action. The antidotes are heat, brandy and ammoniæ.

## DENTAL FORMULÆ.

*A Local Anæsthetic for the Extraction of Teeth, etc.*

℞. Tincturæ Aconiti.....℥ iss
Pyrethri.....℥ iij
Veratrinæ.....gr. x
Morphinæ Sulphas.....gr. iv
Spiriti Rectificati.....℥ iv
Chloral Hydratis.....gr. iv. M.

Let stand 4 days and then filter.

SIGNA.—Apply to the gum over root of tooth to be removed, for 60 seconds, by means of an applicator.

*For Neuralgia.*

℞. Linimenti Aconiti.
Lin. Belladonnæ...āā...℥ vij
Chloroformi.....℥ ij. M.

SIGNA.—Apply, on lint, to the part affected, and cover with a fine piece of sponge saturated with warm water.

*For Neuralgia and Rheumatic Pains, Bruises, etc.*

℞. Tincturæ Aconiti.
Chloroformi Venalis,
Spiriti Ammoniæ...āā..f℥ ij
Olei Ricini.....℥ ij
Linimenti Saponis.....f℥ j. M.

SIGNA.—To be rubbed on affected part.

*For Neuralgia.*

℞. Pulveris Radicis Aconiti ℥ x
Camphoræ.....℥ ss
Spiriti Rectificati.....q. s.

Moisten the aconite with some of the alcohol and macerate in a close vessel for 3 days, then percolate slowly into a receiver containing the camphor until the product measures ½-pint.

SIGNA.—Apply with a camel-hair brush.

*For Neuralgia of Fifth Pair of Nerves.*
(For Internal Use.)

℞. Aconitinæ.....gr. $\frac{1}{10}$
Glycerini.
Alcohol.....āā.....℥ j
Aquæ Menthæ Pip.....℥ ij. M.

DOSE.—A teaspoonful.

*For Dental Periostitis.*

℞. Tincturæ Iodi.
Tincturæ Aconiti...āā...℥ ss. M.

SIGNA.—Apply to gum over root of affected tooth *with a camel-hair brush.*

*For Odontalgia.*

℞. Tincturæ Aconiti
Chloroformi.....āā.....f℥ iij
Tinct. Capsici.....f℥ j
Tinct. Pyrethri.
Ol. Caryophylli...āā...f℥ ss
Gum Camph.....℥ ss. M.

SIGNA.—To be applied on a pellet of cotton.

## ÆTHER—ETHER.

### ÆTHER SULPHURICUS—SULPHURIC ETHER.

*Formula.* $C_4H_{10}O$. Sp. gr.—Of pure ether, 0.713; of stronger ether, 0.728; of ordinary officinal ether, 0.750.

*Derivation.* Sulphuric ether is obtained by the distillation of alcohol and sulphuric acid, and is rectified by re-distillation with solution of potassa. The form of sulphuric ether employed for inhalation is still further purified by agitation with water, and it is freed from this and from an excess of alcohol and deleterious acid substances by the action of chloride of lime and freshly calcined lime, when it is known as stronger ether—*Æther Fortior.* Sp. gr. 0.728. Sulphuric ether is a colorless, limpid, volatile and inflammable fluid, with a sweet odor and a hot, pungent taste; on account of its great volatility, it should be kept securely in ground-glass-stoppered bottles. It usually reddens litmus paper slightly; when it does so strongly, the ether is impure. The impurities, besides acids and fixed substances, are heavy oil of wine, an excess of alcohol and water. Acids being detected by litmus paper, may be removed by agitation with potassa; fixed substances may be removed by evaporating the ether. Some alcohol is always found in ether, and it is only when it is present in too great a quantity that the density of the ether is rendered too high. The quantity of alcohol any preparation of ether may contain, can be determined by agitating it in a minim measure with half its volume of a concentrated solution of chloride of calcium. This will remove the alcohol, and the reduction of the volume of ether when it rises to the surface will indicate the amount of alcohol which has been present. Heavy oil of wine can be detected by the ether becoming milky when mixed with water. Ether boils at 98°, F., and a cold of 166° below zero will not freeze it. When kept too long it undergoes decomposition, and is converted in part into acetic acid.

It evaporates so readily and completely in the air as to cause a great degree of cold, hence it has been employed in the form of spray, as a local anæsthetic. It combines with alcohol and

chloroform in all proportions, and dissolves in ten times its volume of water.

*Medical Properties and Actions.* Ether is a diffusible stimulant, antispasmodic, anodyne and anæsthetic. It is administered internally in the form of ether or of Hoffman's Anodyne, compound spirit of ether—*Spiritus Etheris Compositus* (composed of ether, Oss, ethereal oil, f℥vj, and alcohol, Oj); also, in the form of spirit of nitrous ether, *Spiritus Etheris Nitrosi*, and known as sweet spirit of nitre (a solution of nitrous ether in alcohol).

When ether is taken into the stomach, it causes a cooling sensation, after the subsidence of the burning, which is quickly diffused over the body, increased action of the heart, flushing of face and warmth of surface follow in a few minutes; the senses are quickly excited; the mind becomes more active, and the phenomena of alcoholic intoxication result, which soon pass away, leaving a feeling of calmness and sleep.

*Therapeutic Uses.* Ether is employed internally as an antispasmodic and anodyne, for angina pectoris, hysteria, asthma, flatulence, cramp of stomach and bowels, syncope, epilepsy, hiccough, nervous or hysterical headache. Hoffman's Anodyne possesses the antispasmodic and stimulating effects of ether, and the anodyne effects of ethereal oil, or oil of wine, and is also carminative.

*The Spirit of Nitrous Ether* is antispasmodic, diaphoretic, and diuretic, and is employed in febrile affections, dropsies, etc., etc.

*Dose.* Of Ether, f℥ss to f℥j; of Hoffman's Anodyne, f℥ss to ℥ij, in sweetened water; of spirit of nitrous ether, f℥ss to f℥ss.

*Dental Uses.* Ether is employed as a general and local anæsthetic; as a topical anodyne in neuralgia and odontalgia, for which purpose it is generally combined with other agents; in aphthæ and stomatitis; as a counter-irritant, evaporation being prevented.

Sulphuric Ether as an Anæsthetic Agent. Sulphuric ether is generally considered to be a safer anæsthetic agent than chloroform, as but comparatively few deaths have resulted from its inhalation. The discovery of its anæsthetic properties was first made in 1844, by Dr. Horace Wells, a practicing

dentist, of Hartford, Conn.; and Dr. Morton, of Boston, also a dentist, first demonstrated the application of its anæsthetic properties in dentistry and surgery, in 1846.

As the physiological actions of both ether and chloroform are similar, they may be considered as follows: When the vapor of ether or chloroform is inhaled, the first effect is faucial irritation, to a greater or less degree, according to the strength of the agent employed, a feeling of suffocation, with cough, a flow of mucus and the reflex act of swallowing. The desire for air may cause more or less struggling, especially in the case of children. The sensibility of the glottis, however, is soon relieved, the cough ceases, and the inhalation of the agent proceeds without further resistance.

The primary effect is a general exhilaration; and, in the case of ether especially, it is often one of excitement, which, in the majority of cases, may continue for a short time only, while, in other cases, it may, from its duration and violence, give rise to considerable trouble. But, if the inhalation can be continued and this stage of excitement passed over, insensibility soon occurs. The pulse increases in frequency, the respirations become more rapid, and may assume a convulsive character. There is flushing of the face, cerebral intoxication, to a greater or less degree, according to the temperament, such as talking, laughing, singing, crying, etc. In those of a mercurial or hysterical disposition this stage of excitement is more pronounced and persistent, and during its continuance sensibility to pain is considerably diminished, although the sense of touch is still preserved, while those of taste and smell are lost, and complete insensibility soon follows.

When the patient is of a full habit, and in robust health, and the inhalation of the anæsthetic agent has been rapid, the stage of complete insensibility is preceded by a convulsive stage, during which there is rigidity of the voluntary muscles, stertorous breathing and lividity of the face. If the inhalation of the agent be still further continued, the tetanic rigidity of the muscles subsides, the lividity of the face disappears, the breathing becomes quiet, complete muscular relaxation ensues,

power of movement is lost, as shown by the arm, when raised, dropping without resistance, and the conjunctiva of the eye, under mechanical irritation, being perfectly insensible to pain. During complete anæsthesia the surface of the face is cool and bathed in abundant perspiration; the countenance is calm, the eyes closed and the pupils somewhat contracted, the respiration easy and the pulse slower. The functions of respiration and circulation continue, all others being suspended. From such a condition the patient will soon emerge, provided the further inhalation of the agent be stopped; on the other hand, if the inhalation be continued, the functions of respiration and circulation will be suspended, and life will end with the cessation of the action of the heart and the respiratory organs. Sudden death from the inhalation of anæsthetic agents is due to paralysis of the cardiac ganglia. When death occurs during the stage of rigidity and stertorous breathing, it is due to tetanic fixation of the respiratory muscles and obstruction of the pulmonary circulation, accumulation of venous blood in the heart and the arrest of the heart's action.

Death may also ensue by paralysis of the respiratory muscles during the stage of complete muscular relaxation; also by paralysis of the heart during complete insensibility, the motor ganglia being paralyzed.

Death may also occur from depression of the functions and the shock of the accident, or of the surgical operation.

The Administration of Anæsthetics. To administer ether or chloroform, take a folded piece of lint, of three or four thicknesses, and of a size that can be held conveniently in the hollow of the fingers and palm of the hand, and on it pour the anæsthetic agent—a half ounce of ether or a drachm of chloroform. Some prefer a large napkin or towel, folded in the form of a cone, with an opening of an inch or an inch and a half at the apex, for the admission of air. The advantage, however, of the lint over the folded napkin is, that by holding the lint in the hand but little evaporation occurs. Before commencing the inhalation, the condition of the pulse should be ascertained, by placing the middle finger of the left hand

on the left temporal artery, and at the same time endeavor to reassure the patient and allay fear by cheerful words. The clothes should be loose. The inhalation should be commenced by holding the moistened lint or towel three or four inches from the patient's face, directing him to breathe quite naturally, always remembering that a strong atmosphere in the early stages of the inhalation is dangerous, and carefully watching for coughing or acts of swallowing, when, if any such occur, the lint or towel should be moved further away, and approached again more gradually. If the patient shows no signs of the anæsthetic vapor being too strong, the lint or towel may be gradually brought to within an inch and a half of the patient's mouth and nostrils; and to still more concentrate the atmosphere, if lint is used, the hand holding it may be covered with one fold of an ordinary large napkin, which may hang loose over the mouth and chin, but should be so arranged above that the patient's eyes and forehead may remain uncovered and visible. The inhalation should be commenced cautiously, by instructing the patient to breathe quite naturally, and to obey any direction given to raise the hand or open the eyes.

When the inhalation has fairly commenced, it should be continued until there is no winking when the margins of the eyelids are touched or the hand cannot be raised, and the limbs are perfectly relaxed, when the patient is ready for the operation; what is termed the "surgical period" having arrived. An inhalation with chloroform generally takes about four minutes; often more; seldom less. With ether, the time required is longer and the quantity of the agent greater.

It should also be remembered that, in summer, chloroform and ether evaporate more readily than in the colder seasons.

The operator should devote his undivided attention to the patient, during the inhalation of anæsthetics. One finger should be kept on the pulse, and the respiration should be carefully noted; for the latter is of more importance than the former, although the pulse is by no means to be neglected. When the patient becomes excited, he should be watched very

closely, and if the respiration becomes proportionately quickened, so must the vapor of the anæsthetic be proportionately weakened, by withdrawing the lint or towel slightly from the face.

When the muscles become rigid, and the patient holds his breath and becomes livid, the anæsthetic should be given very weak indeed, as such a state of semi-asphyxiation, due to the suspension of respiration, is often followed by extreme rapidity and depth of respiration, and a dangerous condition is apt to supervene, because anæsthesia is added to asphyxia. The cumulative action of these general anæsthetics should also be remembered, for a state of narcosis frequently intensifies for half a minute or more after the suspension of the administration, which is due to the vapor of the anæsthetic which was in the lungs entering the blood after the administration ceases.

Prof. J. J. Chisholm, of the University of Maryland, gives the following five simple rules for the administration of chloroform, and which will apply to ether also.

1. "I always, without a single exception, give a strong drink of whiskey, from one to two ounces, to every adult to whom I intend to administer chloroform. This is done a few minutes before the operation.

2. Always loose the neck and chest clothing, so as to have no impediment to respiration.

3. Only administer chloroform in the recumbent posture, with body perfectly horizontal and head on a low pillow, this pillow to be removed as the anæsthesia progresses.

4. Give chloroform on a thin towel, folded in conical form, with open apex, so that the vapor, before inhalation, will be freely diluted with atmospheric air. In holding this cone over the face of the patient, at some little distance from the nose, place the fingers under the borders of the cone, for the double purpose of allowing air to enter freely, and also to prevent the chloroform liquid on the towel from coming in contact with the skin of the patient's face, and thereby avoid its blistering effects.

5. Should loud snoring occur, force up the chin. This

manipulation, by straightening the air passages from the nose to the larynx, makes easy breathing. The forcible elevation of the chin is far better in every respect than pulling out the tongue. It is easier of application, more quickly done, requires no instruments, and is much more efficient in removing the impediment to respiration.

While operating, I have constantly in view both the color of the face and the respiration of the patient, which I consider even more important for the surgeon to observe than to feel the pulse"

When ether or chloroform is administered for the extraction of teeth, the operation should be performed in a dental chair so constructed as to admit of the patient being placed in as horizontal a position as is possible, to operate successfully, and every instrument it is necessary to use should be within reach of the hand of the operator. As soon as the operation is completed, the head of the patient should be gently inclined to the side, so as to permit the blood to run from the mouth and not pass down the throat. Any considerable change in the position of the patient should be avoided until recovery has taken place. Fresh air should be admitted by lowering the window, and the patient freely supplied with it by means of a fan.

THE DANGERS OF ANÆSTHESIA.—The conditions rendering general anæsthetics dangerous are fatty degeneration of the heart (a prominent contra-indication); previous alcoholic habits; brain tumors and degenerations; respiratory obstruction from swollen epiglottis, enlarged tonsils, œdema glottidis, laryngeal paralysis, thoracic tumors or aneurism; emphysema and obstructed pulse circulation from engorgement of right heart and deficient heart power; valvular lesions; incomplete anæsthesia during painful surgical operations, causing death from shock, as the result of peripheral irritation. Muscular debility and weakness from exhaustion, if otherwise uncomplicated, are considered to be rather aids to anæsthesia than contra-indications.

PREVENTIVE MEASURES AGAINST THE DANGERS OF ANÆSTHESIA.—A thorough examination for sources of danger

should always be made previous to the administration of the anæsthetic. An anæsthetic should never be administered on a full stomach, as an anæsthesia of the glottis prevents the expulsion of vomited matter from the larynx, in case it enters by regurgitation. An anæsthetic should never be administered after long fasting, as absence of nutrition may tend toward cardiac paralysis. One or two ounces of whiskey should be administered immediately before the operation. All excitement should be avoided to the patient from fear, sight of instruments, too many spectators, etc., all of which tend to induce shock. All appliances for resuscitation should be at hand, and plenty of fresh air be available during the inhalation. In using chloroform mix only three and a half per cent. of the vapor with air, to ensure safety. In the administration of ether the respirations, according to some authorities, alone need be watched; in chloroform, however, both the respirations and the pulse should be carefully noted.

Treatment of Dangerous Symptoms of Anæsthesia.—The suspension of the heart's action necessitates the immediate withdrawal of the vapor and the immediate *inversion* of the patient, according to Nēlaton's method. The failure of respiration necessitates the forcible drawing out of the tongue to lift the epiglottis; the practice of artificial respiration by the Sylvester method, and by faradization of the respiratory muscles; the inhalation of gtt. iij to gtt. v of nitrite of amyl; ammonia to the nostrils; galvanism (the positive pole being placed to the nostril, and the negative pole over the diaphragm, to excite a reflex action between the fifth pair and the pneumogastric, or the poles may be placed directly over both phrenic nerves, on a line with the fourth cervical vertebræ, in order to stimulate respirations; or one pole may be placed over the upper dorsal spinous process, and the other pole over the apex of the heart, to induce cardiac contraction). Artificial warmth should be applied, but no cold applications.

The inversion of the body, according to Nélaton's method, and artificial respiration, according to Sylvester's method, and Marshall Hall's ready method, are safe, and are the most

promising expedients. A simple method of producing artificial respiration is as follows:—

"With outspread palms, press the front of the chest forcibly down, whilst an assistant at the same time presses the abdomen. Make these movements not oftener than fifteen times in the minute."

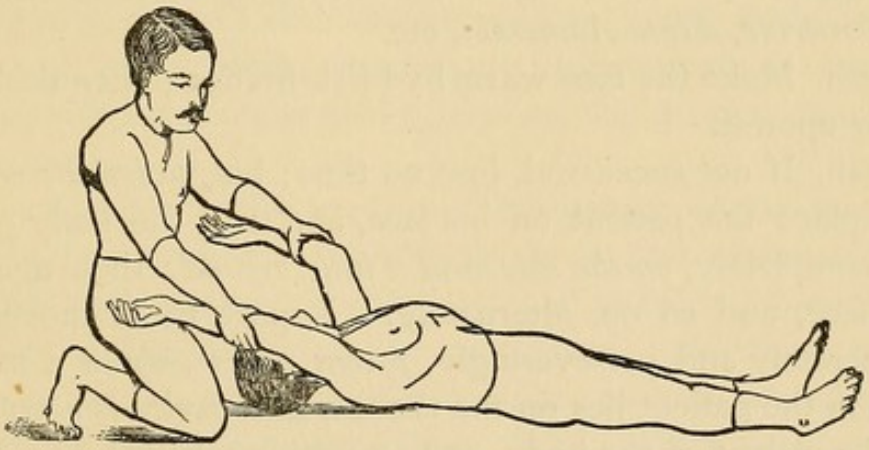
DR. H. R. SYLVESTER'S METHOD OF RESUSCITATION.

"*To Adjust the Patient's Position.* Place the patient on his back, on a flat surface; raise and support the head and shoulders on a small, firm cushion, or folded article of dress, placed under the shoulder-blades; remove all tight clothing about the neck and chest.

"*To Maintain a Free Entrance of Air into the Windpipe.* Cleanse the mouth and nostrils; open the mouth; draw forward the patient's tongue, and keep it forward; an elastic band over the tongue and under the chin will answer this purpose.

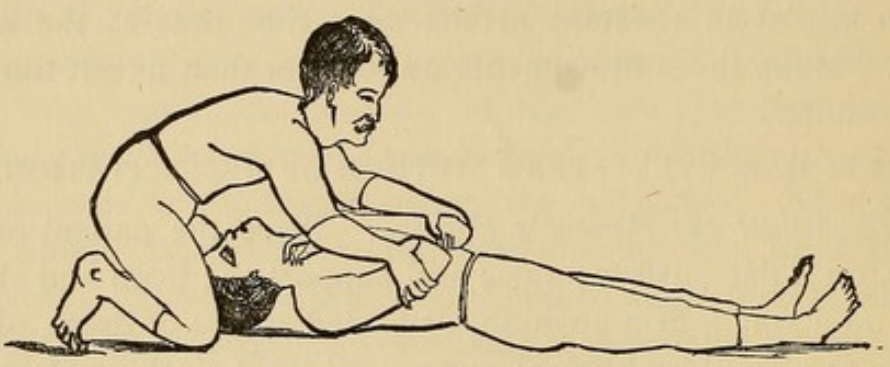
"*To Imitate the Movements of Breathing:*—

"*First, Induce Inspiration.* Place yourself at the head of the patient; grasp his arms; raise them upward by the sides of his head; stretch them steadily, but gently, upward and backward, for two seconds. By this means fresh air is drawn into the lungs, by raising the ribs.



"*Secondly, Induce Expiration.* Immediately turn down the patient's arms, and press them firmly, but gently, downward against the sides of his chest, for two seconds. By this means foul air is expelled from the lungs, by depressing the ribs.

"*Thirdly, Continue these Movements.* Repeat these movements alternately, deliberately and perseveringly, fifteen times in a minute, until a spontaneous effort to respire be perceived.



By these means an exchange of air is produced in the lungs, similar to that effected by natural respiration."

MARSHALL HALL'S READY METHOD IN ASPHYXIA.

"1st. Treat the patient *instantly, on the spot,* in the *open air,* freely exposing the face, neck and chest to the breeze, except in severe weather.

"2d. In order *to clear the throat,* place the patient gently on the face, with one wrist under the forehead, that all fluid, and the tongue itself, may fall forward, and leave the entrance into the windpipe free.

"3d. *To excite respiration,* turn the patient slightly on his side, and apply some irritating or stimulating agent to the nostrils, as *Veratrine, dilute Ammonia,* etc.

"4th. Make the face warm by brisk friction; then dash cold water upon it.

"5th. If not successful, lose no time; but, *to imitate respiration,* place the patient on his face, and turn the body gently, but completely, *on the side and a little beyond;* then again on the face, and so on, alternately. Repeat these movements deliberately and perseveringly, *fifteen times only* in a minute. (When the patient lies on the thorax, this cavity is *compressed* by the weight of the body, and *ex*piration takes place. When he is turned on the side, this pressure is removed, and *in*spiration occurs.)

"6th. When the prone position is resumed, make a uniform and efficient pressure *along the spine,* removing the pressure

immediately before rotation on the side. (The pressure augments the *ex*piration; the rotation commences *in*spiration.) Continue these measures.

"7th. Rub the limbs *upward*, with *firm pressure* and with *energy*. (The object being to aid the return of venous blood to the heart.)

"8th. Substitute for the patient's wet clothing, if possible, such other covering as can be instantly procured, each by-stander supplying a coat or cloak, etc. Meantime, and from time to time, *to excite inspiration*, let the surface of the body be *slapped* briskly with the hand.

"9th. Rub the body briskly till it is dry and warm, then dash *cold* water upon it, and repeat the rubbing.

"Avoid the immediate removal of the patient, as it involves a *dangerous loss of time;* also the use of bellows, or any *forcing* instrument; also, the *warm bath*, and *all rough treatment.*"

Local Anæsthesia. The fatality attending the use of general anæsthetics led to the introduction of what are termed "local anæsthetics," the most important of which depend upon the therapeutic property of cold, which is properly an anæsthetic only when it freezes the part to which it is applied. The use of cold for such a purpose must necessarily be limited to small parts of the body, and its utility depends upon the ease and rapidity with which a desired spot of living flesh can be frozen; in other words, temporarily deprived of its vitality, without inflicting mechanical injury on the delicate structure of the part.

According to Dr. Richardson, the proposer of the method, the principle consists in directing on a part of the body a volatile liquid, having a boiling point at or below blood heat, in a state of fine subdivision or spray, such subdivision being produced by the action of air or other gaseous substance on the volatile liquid to be dispersed. When it falls on a part of the body, it comes with force into the most minute contact with the surface upon which it strikes.

As a result, there is rapid evaporation of the volatile fluid, and so great an evolution of heat force from the surface of the

part to which the spray is applied, that the blood cannot supply the equivalent loss. The part consequently dies for the moment, and is insensible; but as the power of the body is unaffected, the blood, as soon as the external reducing agency is withdrawn, quickly makes its way again through the dead parts, and restoration rapidly occurs.

The fluids used are ether, of a specific gravity not exceeding 0.723, rhigolene, a product of petroleum, and the lightest liquid known, and bromide of ethyl.

When a current of the volatile liquid, either atomized ether or rhigolene, comes in contact with the skin, by the use of the spray apparatus, an intense degree of cold is produced, which deprives the nerves of the part of their power to transmit impressions to the sensorium. For the extraction of teeth, destruction of the pulps of teeth, opening abscesses, and other minor surgical operations, and neuralgia of superficial nerves, success has attended the use of such local anæsthetics. The greatest objections to such a method of inducing local anæsthesia are the great pain which attends the first application, and the unpleasant burning sensation of the part when it is recovering from the freezing process. (See Rhigolene.) (See Aconite, for obtunding mixture.)

Electro-magnetism has also been employed as a local anæsthetic, and it is a mooted question whether it relieves pain or complicates the sensations. It is well, however to remember, that some persons are so peculiarly constituted as to render them very susceptible to the influence of electricity. (See Electricity as a Therapeutic Means, etc.).

## ALCOHOL—ALCOHOL.

*Formula.* $C_2H_6HO$. Sp. gr. of officinal alcohol, 0.835; of rectified spirit—*Spiritus Rectificatus*, 0.838; of stronger alcohol, —*Alcohol Fortius*, 0.817; of diluted alcohol—*Alcohol Dilutum* (equal parts of alcohol and distilled water), 0.941.

*Derivation.* Alcohol is obtained from vinous or fermented liquors by repeated distillations, and, in its officinal form, contains about fifteen per cent. of water. It is colorless, inflam-

mable, wholly vaporizable by heat, and unites in all proportions with water and ether. It frequently contains such impurities as fusil oil or amylic alcohol (obtained from fermented grain or potatoes), the presence of which can be detected by agitating the alcohol with sulphuric acid, when the former becomes colored.

STRONGER ALCOHOL—*Alcohol Fortius—Absolute Alcohol*—is obtained by agitating the officinal alcohol with heated carbonate of potassium.

*Medical Properties and Actions.* All the different forms of alcohol, including brandy—*Spiritus Vini Gallici* (the spirit obtained from fermented grapes by distillation, and containing 48 to 56 per cent., by volume, of absolute alcohol); whiskey—*Spiritus Frumenti* (the spirit obtained from fermented grain by distillation, and containing from 48 to 56 per cent., by volume, of absolute alcohol); wine—*Vinum* (the fermented juice of the grape, and containing alcohol in varying proportions), are powerful diffusible stimulants, increasing the action of the heart and arteries, exciting the nervous and vascular systems, and causing a general exhilaration of spirits. Excessive quantities produce the effects of narcotic poisons, ending in coma and death.

The habitual use of alcoholic drinks causes most injurious effects upon the system generally, and directly upon the mucous coats of the stomach, deranging and destroying its functions and structure, resulting in dyspepsia, followed by cirrhosis of the liver and kidneys, loss of mental and physical strength, derangement of the nervous system, and, at last, delirium tremens. When properly administered in diseased conditions, however, alcoholic preparations are valuable agents.

*Therapeutic Uses.* The different forms of alcohol are employed as stimulants in acute inflammations, such as pneumonia, pleurisy, bronchitis, pulmonary affections of children, etc., etc., and in rheumatic pericarditis, in the latter stages of typhus and typhoid fevers, diphtheria, acute neuralgia, convulsions of dentition, tetanus, asphyxia from cold, pyæmia, etc., etc.

Externally in superficial inflammation, bruises, sprains, ptyalism, gout, cerebral affections, bed sores, etc., etc.

*Dental Uses.* Alcohol, as a narcotic, is employed to relieve pain. In combination with tannic acid or chloride of zinc, it obtunds the sensibility of dentine; as a styptic, it arrests hemorrhage from relaxed tissues, coagulating the blood by its effect on albumen, and causing contraction of the mouths of the vessels by its astringent property. Equal parts of alcohol and water make an excellent application as an evaporating lotion, for the relief of superficial inflammations. For suppurating wounds, it is a useful antiseptic dressing, as it destroys germs, removes fetor, and stimulates the tissues to a more healthy action. It also favors the cicatrization of open wounds, coagulating the albumen, and forming an impermeable covering. In mercurial salivation (mercurial stomatitis), it forms an excellent gargle.

For softened and sensitive dentine, and for drying cavities preparatory to filling them, the stronger or absolute alcohol is employed. A simple method of preparing this form of alcohol is to add one part of carbonate of potassa to four parts of the ordinary or officinal alcohol. Owing to the great affinity carbonate of potassa has for water, it abstracts the latter from the alcohol to a sufficient degree to answer all practical purposes.

The cavity of a tooth is first dried with cotton and bibulous paper, and then bathed with the absolute alcohol, which at once evaporates, and causes the almost perfect absorption of moisture.

Brandy and water form, in combination, an excellent lotion for mercurial and other forms of stomatitis.

## DENTAL FORMULÆ.

*For Obtunding Sensitive Dentine.*

℞. Alcohol (Absolute)..... ℥ss
Acidi Tannici..... ʒss
Glycerini..... ℥ss. M.

*For Superficial Inflammations.*

℞. Alcohol
Aquæ.....āā..... ℥ss. M.

SIGNA.—To be applied as a lotion.

*For Obtunding Sensitive Dentine.*

℞. Alcohol (Absolute)..... ℥ss
Zinci Chloridi..... ʒss
Glycerini ..... ℥ss. M.

*For Mercurial Stomatitis.*

℞. Spts. Vini Gallici.....1 part
Aquæ.....4 to 6 parts. M.

SIGNA.—To be used as a gargle.

## ALUMEN—ALUM.

*Formula.* $Al(NH_4)_2(SO_4)12H_2O$.

*Source.* It is found native in Italy, in the neighborhood of volcanoes, and is the mineral from which the metal aluminium is obtained.

*Derivation.* Alum is also obtained from aluminous slate, shale or schist, from which it is obtained by the process of roasting and exposure to the air.

Alum is a white, slightly efflorescent salt, which crystallizes in regular octahedrons. It possesses an astringent, acid, and sweetish taste. It is insoluble in alcohol, but dissolves in from fourteen to fifteen times its weight of cold, and three-fourths of its weight in boiling water.

*Medical Properties and Action.* Alum is astringent and styptic, and is employed both externally and internally. When taken internally, it is absorbed into the system, and has been detected in the liver, spleen and urine. Excessive doses cause vomiting, griping, purging, and inflammation of the gastro-enteric mucous membrane. Powdered alum, in doses of a teaspoonful, is an efficient emetic. It coagulates albumen, and causes an abundant flow of saliva, coagulating the albumen of the saliva and buccal mucus in whitish, membranous flakes.

Its astringent influence is chiefly upon mucous surfaces. Applied locally to relaxed or bleeding parts, it corrugates the surrounding tissues and causes contraction of the capillaries, and, in this manner, acts as an astringent.

*Therapeutic Uses.* Alum is internally administered in diarrhœa, chronic dysentery, colica pictonum, catarrh of the stomach, etc. Externally it is applied in ulcerated and relaxed throat affection, ptyalism, gonorrhœa and gleet, uterine hemorrhage, morbid growths, hæmaturia, ophthalmia, chronic whooping cough, chronic skin diseases, chilblains, ulcers, hospital gangrene, etc., etc.

*Dose.* Of Alum, gr. x to ℈j or ℈ij, in powder, or solution in water, or in some simple infusion.

Ammonia Alum. Sulphate of alumina and ammonia—

*Aluminæ et Ammoniæ Sulphas*, is prepared by adding sulphate of ammonia to a solution of sulphate of alumina.

Dried Alum—*Alumen Exsiccatum* (alum deprived of its water of crystallization by heat), is employed externally as a mild escharotic, to destroy exuberant granulations, etc.

*Dental Uses.*—Alum is employed in dental practice as a styptic in alveolar hemorrhage; as a gargle in stomatitis, ulceration, and sponginess of the gums, morbid or fungous growth of gums, dental pulp, etc., superficial hemorrhage from the mucous membrane of the mouth, ulcers of the mouth, cancrum oris, odontalgia, etc., etc. In congested conditions of the mucous membrane of the mouth and throat, alum gargles afford great relief.

The habitual use of alum as an ingredient of a dentifrice is injurious to the teeth, on account of the sulphuric acid it contains.

Potassa alum—*Aluminii et Potassii Sulphas*, the alum of commerce (which has been superseded by ammonia alum), will render plaster casts hard, when they are boiled in a strong solution for half an hour.

## DENTAL FORMULÆ.

*For Odontalgia.*

℞. Pulveris Aluminis..... ℥ ij
Ætheris Nitrici..... ℥ vij. M.

Signa.—To be applied on a pellet of cotton.

*For Ulceration of the Gums and Mucous Membrane of the Mouth.*

℞. Aluminis..... ℥ j
Zinci Sulphatis..... ℥ ss
Sodii Borat..... grs. iv
Aquæ Rosæ..... ℥ viij. M.

Signa.—To be applied as a lotion.

*For Inflamed and Ulcerated Mucous Membrane and Gums.*

℞. Pulveris Aluminis..... gr. lxxx
Aquæ Destillatæ..... f ℥ x. M.

Signa.—To be used as a mild, astringent gargle.

*For Ulcerated and Spongy Gums.*

℞. Aluminis..... ..... ℥ j
Vini..... Oj
Tinct. Cinchonæ..... ℥ ss
Tinct. Myrrhæ..... ℥ ij
Mel. Rosæ..... ..... ℥ ij. M.

Signa.—To be used as a gargle.

*For Inflammation and Ulceration of the Mouth and Throat.*

℞. Infus. Lini ..... ℥ xv
Tinct. Kino..... ℥ j
Aluminis..... ℥ ij. M.

Signa.—To be used as a gargle.

## ALUMINÆ ACETAS—ACETATE OF ALUMINA.

*Formula.* $Al_2O_3 2C_4H_3O_3 + 4HO$.

*Derivation.* The salt, acetate of alumina, is obtained by the direct combination of hydrated alumina with acetic acid, or by reaction between sulphate of alumina and acetate of lead. The solution, when properly prepared, is a clear fluid, of a sharp, sweetish, astringent taste, and a distinct odor of acetic acid. When it is evaporated, there is deposited light, fragile, glossy scales, which are perfectly soluble in water, and not readily affected by the atmosphere.

*Medical Properties and Action.* It is disinfectant and antiseptic. In maximum doses it produces an unpleasant sensation of warmth and fullness in the stomach, and, at the same time, vertigo and confusion of the senses, which may continue for several hours.

*Therapeutic Uses.* Acetate of alumina is rarely employed internally, and only for zymotic and contagious diseases. It is generally used externally, and is a very effectual remedy in the treatment of wounds, preventing pyæmia in suppurating wounds and ulcers. It is also applied in parasitic skin affections, as an injection in gonorrhœa, and for the destruction of animalculæ in putrescent fluids. As a surgical dressing, it is used by keeping the wound saturated with a solution of moderate strength, or by irrigation. A concentrated solution will preserve anatomical subjects for a considerable time.

*Dose.* Of Acetate of Alumina, gtt. xx to gtt. 60 of the solution.

*Dental Uses.* Acetate of alumina is useful in dental practice, as an antiseptic and disinfectant in cancrum oris, ulcers of the mouth, suppurating wounds of mucous membrane, pyorrhœa alveolaris, alveolar abscess, etc. A very weak solution has been employed as a mouth-wash for offensive breath, depending on scrofulous ulcerations, aphthæ, caries of the teeth, or the wearing of artificial teeth.

## LIQUOR AMMONII ACETATIS—SOLUTION OF ACETATE OF AMMONIA.

SPIRIT OF MINDERERUS.

*Formula.* $NH_4C_2H_3O_2$.

*Derivation.* Spirit of Mindererus is obtained by saturating diluted acetic acid with carbonate of ammonia, being a solution of the acetate of ammonia.

It is a colorless liquid, with a saline taste, and requires to be freshly made when about to be used.

*Medicinal Properties and Action.* It is refrigerant, diaphoretic, and diuretic, and its action can be greatly increased by combination with other remedies. Few medicines are in more general use.

*Therapeutic Uses.* Spirit of mindererus is employed in the treatment of febrile and inflammatory affections, and exanthemata, sick headache, catarrh and influenza, etc., etc. Externally it is used as a lotion to sprains, bruises, glandular enlargements, etc.

*Dose.* Of Spirit of Mindererus, f℥j to f℥j.

*Dental Uses.* A lotion composed of one part to ten of water is a serviceable application in inflamed conditions of mucous membrane. Internally administered as a refrigerant, it is useful in acute periosteal inflammation, inflammation of the dental pulp—pulpitis, etc.

## AMMONII CARBONAS—CARBONATE OF AMMONIUM.

*Formula.* $N_4H_{18}C_3O_9$.

*Derivation.* Carbonate of Ammonium is a sesquicarbonate, and is obtained by subliming a mixture of chloride of ammonium and chalk. It is in the form of white, translucent masses, with a pungent, ammoniacal odor, and an acrid, alkaline taste. It is soluble in water, and on exposure to the air it becomes opaque and falls into powder, losing its ammonia.

*Medical Properties and Action.* It is antacid, stimulant, diaphoretic and expectorant, and is considered to be especially

useful in cases where the vital powers are greatly depressed. In large doses it causes colic, convulsions and great disturbance of the nervous system, and, when long continued, an annoying itching of the scalp, and skin over the surface of the body. It has a tendency to fluidify the blood. Internally, as a diffusible stimulant, it is preferred to solution of ammonia.

*Therapeutic Uses.* It is internally administered in diabetes, scrofula with languid circulation, asthma, pneumonia, croup, chorea, diseases of the skin, puerperal insanity, mercurial erethism, drunkenness, etc., etc.

Externally it is employed as a volatile or smelling salts, in syncope, hysteria, and asphyxia.

*Dose.* Of Carbonate of Ammonium, gr. v to gr. x, in pill, or in solution with gum and sugar.

*Dental Uses.* It is a useful internal remedy in cancrum oris, in doses of gr. v, gradually increased to gr. x, every two or three hours, using strong nitric acid as a local application. It is also a very useful remedy in mercurial erethism, in conjunction with camphor and other stimulants.

## AMMONII VALERIANAS—VALERIANATE OF AMMONIUM.

*Formula.* $NH_4C_5H_9O_2$.

*Derivation.* Valerianate of Ammonium is obtained by combining valerianic acid with a strong solution of ammonia, and evaporating to a syrupy consistence; it is also obtained by subjecting the monohydrated acid to the action of dry, gaseous ammonia. It is in the form of a white salt, in quadrangular plates, with the odor of valerianic acid, and a sharp, sweetish taste. It is soluble in water and alcohol.

*Medical Properties and Action.* It is stimulant, nervine, and antispasmodic.

*Therapeutic Uses.* It is employed in neuralgia, nervous headache, hysteria, epilepsy, chorea, etc., etc.

*Dose.* Of Valerianate of Ammonium, gr. ij to gr. viij, in pill, or in elixir, with aromatics (valerianate of ammonium ℥j, fluid extract of vanilla f℥ss, tincture of cardamom f℥vj, curacoa,

f℥ij, water f℥iv—*Misce.* Dose, a teaspoonful three times a day).

*Dental Uses.* It is internally administered for neuralgia.

## AMMONII CHLORIDUM—CHLORIDE OF AMMONIUM.

MURIATE OF AMMONIA—HYDROCHLORATE OF AMMONIA—SAL AMMONIAC.

*Formula.* $NH_4Cl$.

*Derivation.* Chloride of Ammonium is obtained by neutralizing hydrochloric acid with ammonia, and evaporating to dryness. It is in the form of a snow-white, crystalline powder, soluble in two and a half parts of cold water, and sparingly soluble in alcohol. It has a pungent, saline taste.

*Medical Properties and Action.* In large doses it is an irritant poison, with a purging action; but in small doses it is a powerful resolvent alterative; it is also refrigerant and anodyne. Its action upon the system closely resembles that of mercury as an alterative.

Externally it is used as a discutient application, and as a cold lotion in fevers, hernia, etc.

*Therapeutic Uses.* It is employed internally in amenorrhœa, rheumatic affections, chronic bronchitis, pneumonia, dropsical affections, hemorrhages, whooping cough and myalgia. Externally in abscesses of the mamma, skin diseases, ecchymosis of the eye, hydrocele, senile gangrene, gonorrhœa, leucorrhœa, etc.

*Dose.* Of Chloride of Ammonium, gr. v–xxx, every two or three hours, in powder or mucilage.

*Dental Uses.* It is employed in facial neuralgia, in doses of ℥ss, repeated four times daily. Externally it is used as an application to indolent ulcers, for its stimulating effect. As a gargle, it is employed in the strength of ℥ss to ℥xij of water. It is also applied to cancerous tumors, and has been used to restore zinc which has become deteriorated from long use in laboratory work. Chloride of ammonium (sal ammoniac) is also used as a flux, in refining gold for laboratory use.

## AMYLENE—AMYLENE.

*Formula.* $C_5H_{10}$.

*Derivation.* Amylene is obtained by distilling amylic alcohol with chloride of zinc. It is a colorless, very mobile liquid, with a boiling point of 102°, and the density of its vapor 2.45. It has a very peculiar and disagreeable smell.

*Medical Properties and Action.* Amylene was introduced as an anæsthetic in 1856, by the late Dr. Snow, who regarded it as possessing the following advantages: the safety of ether, absence of pungency and irritating property, readiness with which the absence of pain is obtained, with less coma than with chloroform or ether, the speedy recovery from its effects, less nauseating, and less headache and rigidity and struggling than in the case of ether or chloroform. Others, however, have not been so much impressed with this anæsthetic agent as was Dr. Snow; hence, it has not been regarded with the same favor as other agents of this class. An extreme quantity being required to produce complete insensibility to pain, its operation is considered to be dangerous.

*Therapeutic Use.* As an anæsthetic.

## AMYL NITRIS—NITRITE OF AMYL.

*Formula.* $C_5H_{11}NO_2$. Sp. gr. 0.877.

*Derivation.* Nitrite of Amyl is obtained by heating one part of strong nitric acid, with two parts of rectified fusil oil, until reaction commences, when the heat is withdrawn, and afterwards re-applied. The distilled portion, obtained below 212° F., is rectified by means of carbonate of potassium, and that portion only distilling between 202° and 206° F. is reserved, being a nitrite of the oxide of amyl. It is a yellowish or amber-colored liquid, somewhat oily, very volatile and inflammable, and boils at 182° F. It has an odor like that of ripe pears.

*Medical Properties and Action.* It is used by inhalation, causing an accelerated action of the heart, sudden flushing of the face, dilatation of the arteries, a sense of great fullness of the brain, a lowering of the blood pressure and temperature,

and complete resolution of the muscular system. The vapor of nitrite of amyl, when applied directly to the muscular or nervous tissues, arrests their functional activity, and, circulating in the blood, appears to act most on the vaso-motor system and unstriped muscular fibre.

*Therapeutic Uses.* Being a powerful stimulant to the heart, it is an antidote to chloroform. A case is mentioned in the *British Medical Journal*, where, during chloroform narcosis, respiration ceased, and artificial respiration failed to restore the patient. Some nitrite of amyl was then poured on lint, and held to the patient's nostrils. In ten seconds there was a flushing of the face, the pulse was again felt, and respiration was restored.

When from two to five minims are poured on lint and applied to the nostrils, the heart's action will be accelerated, a sudden flushing of the face takes place, dilatation of the arteries results, also a fall in the blood pressure and a lowering of the temperature, and complete muscular relaxation.

*Therapeutic Uses.* By inhalation, for relieving the pain of angina pectoris; also used in asthma, strychnia poisoning, hydrophobia, tetanus, epileptic attacks, and in many other convulsive or spasmodic diseases.

*Dose.* Of Nitrite of Amyl, ℥ij to ℥v, by inhalation; not more than gtt. iij should be administered, unless the patient has been accustomed to its use.

*Dental Uses.* As an antidote to chloroform narcosis, for the relief of epileptic attacks during the extraction of teeth, for the relieving the pain of neuralgia of the fifth pair of nerves, and for restoration from syncope. As nitrite of amyl is a powerful and dangerous agent, care must be observed in its use, and but small doses applied at first, as some patients, especially the weak and nervous, are very susceptible to its influence.

## AQUA DESTILLATA—DISTILLED WATER.

*Derivation.* "Take of water 80 pints. Distill two pints, using a tin or glass condenser, and throw them away; then distill 64 pints, and keep them in glass bottles."—U. S. D.

*Properties.* Distilled water has a vapid, and by no means pleasant taste, and is only perfectly pure when the vessel used in the distillation is of silver. It should evaporate without residue.

*Therapeutic Uses.* It is very essential in the preparation of some formulæ, and of no use whatever in others, as the common pure water will answer. Such agents as tartar emetic, nitrate of silver, corrosive sublimate, chlorides of calcium, barium, acetate and subacetate of lead, permanganate of potassa, the sulphates of iron and zinc, sulphate of quinia, the salts of morphia, and all the alkaloids and their salts, require, when given in solution, distilled water.

*Dental Uses.* Distilled water is required in the preparation of many formulæ for use in dental practice.

## ARGENTI NITRAS—NITRATE OF SILVER.

### Lunar Caustic.

*Formula.* $AgNO_3$.

*Derivation.* Nitrate of Silver is obtained by dissolving silver in nitric acid and distilled water, and evaporating the solution. It is in the form of a heavy, colorless, anhydrous salt, and crystallizes in shining, rhombic plates. The action of light and organic matters causes it to turn black. It is wholly soluble in distilled water, the only preparation of water that should be employed in forming solutions of this salt. It has a strong, metallic, styptic taste. In the preparation of the solid form of sticks, it is first melted and poured into moulds, exposure to the light causing the sticks to become gray, and more or less dark, owing to the reduction of the silver by the sulphuretted hydrogen contained in the atmosphere; hence, on account of the decomposition of this salt, it should be carefully excluded from the light.

*Medical Properties and Action.* Nitrate of Silver is tonic, antispasmodic, sedative, and astringent. When applied to the skin, mucous membrane, or ulcers, it produces, at first, a white appearance, owing to its union with the coagulated albumen of the cuticle, but this gradually changes to a bluish-gray, purple, and finally, black color, on account of the partial reduction of the silver by the sulphuretted hydrogen. Small doses, administered for a long time, give a peculiar blue appearance to the skin. When internally administered, it has an astringent action on the mucous coats of the intestines. It is a powerful tonic to the nervous system, and has been chiefly employed as an antispasmodic tonic. It is chiefly used externally, as a stimulant, vesicant, and escharotic. If applied, even lightly, three or four times, to the moistened skin, it will cause vesication in a few hours. The blue appearance on the skin, when small doses are long continued, is said to be preceded by a peculiar blue line on the gums, like that from lead poisoning. A very minute quantity of this salt, when internally administered, is eliminated by the kidneys, as most of it escapes by the liver and the intestinal glands, a portion remaining permanently deposited in the tissues when its use has been long continued. Six weeks is the length of time it is safe to continue its internal use, and during that time occasional purgatives should be given, to promote its elimination. The persistent use of iodide of potassium and of the hyposulphite of soda will cause the absorption and excretion of the silver deposits, in cases of skin discoloration from its long continued use, aided by baths of the hyposulphites, and the very careful use of lotions containing cyanide of potassium, which possesses a solvent power over silver deposits. As long as inflammation is present, it should not be internally administered, and during a course, it should be occasionally intermitted for a few days, and a purgative used. The gums and fauces should be frequently examined, and if the slightest blue discoloration is observed, the remedy should be discontinued. Exposure to the sun should be avoided.

*Therapeutic Uses.* Nitrate of Silver is internally employed in dyspepsia, chronic gastritis, chronic diarrhœa and dysentery,

cholera, diseases of the eye, chorea, epilepsy, asthma, and whooping cough.

Externally in ophthalmia and other diseases of the eyes, cutaneous diseases, diphtheria, erysipelas, hydrophobia, enlargement of glands, diseases of the genito-urinary organs, diseases of the ear, burns, ulcers, etc., etc.

*Dose.* Of Nitrate of Silver, gr. 1/6, gradually increased to gr. ½ three times a day, in pill made of some vegetable powder, or in solution. The fused nitrate of silver—*Argenti Nitras Fusa*—or solid form, is used externally.

*Dental Uses.* For inflamed and ulcerated conditions of the mucous membrane of the mouth, nitrate of silver is a valuable application, in the form of injections or solutions of various strengths, from gr. ij to ℥ss of distilled water; also in diseases of the antrum and fistula, as an injection. It is also used as a styptic, for the arrest of alveolar hemorrhage, but is not so reliable as the preparations of iron, tannic acid, etc , on account of the coagulum or clot formed by it, being soluble in an excess of albumen. It is also employed to obtund the sensitiveness of dentine, especially where the cause is mechanical abrasion; also in aphthæ, mercurial stomatitis, ulceration of the gums, salivary fistula, alveolar abscess. For obtunding sensitive dentine, the stick form (one end of a stick inserted into a quill, or fused on the end of a platinum wire), is employed; or the end of a silver wire may be immersed in nitric acid, and applied to the sensitive surface, taking care to limit its action to the part on which it is to act. When applied to sensitive dentine, it acts on the gelatinous portion of the tooth, destroying its vitality to the extent of the combination which takes place. The objection to its use in such cases is the discoloration it causes.

As salt decomposes the nitrate of silver, a solution of the chloride of sodium will relieve the excessive pain following its application to sensitive dentine, or to ulcers of the mouth; such a solution will also remove recent stains, if followed by the application of a solution of ammonia. Old stains may be removed with tincture of iodine, followed by cyanide of potassium.

The antidote in cases of poisoning by nitrate of silver is chloride of sodium (common salt), which converts it into chloride of silver, to be followed by emetics, and the proper antiphlogistic treatment.

### DENTAL FORMULÆ.

*For Inflamed and Ulcerated Mucous Membrane.*

℞. Argenti Nitratis..gr. ij to ʒ ss
Aquæ Destillatæ.....f ℥ j. M.
SIGNA.—To be used as a lotion.

*For Mercurial Stomatitis.*

℞. Argenti Nitratis.....gr. ss
Aquæ Destillatæ.....f ℥ j. M.
SIGNA.—To be used as a mouth-wash.

*For Disease of the Antrum.*

℞. Argenti Nitratis..gr. j to gr. v
Aquæ Destillatæ.....f ℥ j. M.
SIGNA.—To be used as an injection.

*For Ulcers and Aphthæ.*

℞. Argenti Nitratis.....ʒ ss
Aquæ Destillatæ.....℥ j. M.
SIGNA.—To be applied with a camel-hair brush.

## ARNICA—ARNICA.

### LEOPARD'S BANE.

*Source.* Arnica Montana is a perennial, herbaceous plant, of which the dried flowers and root—*Arnicæ Flores and Arnicæ Radix*—are the medicinal portions, and is found in the mountains of Northern Europe and the Northwestern portions of America.

*Medical Properties and Action.* Arnica is nervine, stimulant, and diaphoretic. In over doses, it is an acro-narcotic poison, causing vomiting, purging, vertigo, tetanic twitchings of the muscles, and convulsions. Moderate doses, when long continued, are liable to cause a very troublesome eruption. Its activity depends upon an alkaloid—*Arnicina*, which is a bitter and acrid extractive.

*Therapeutic Uses.* Arnica is administered internally in typhus and typhoid fevers, chronic dysentery, rheumatic gout, etc., etc. Externally to bruises, sprains, lacerations, chilblains, etc., in the form of tincture—*Tinctura Arnica.* The antidote for poisoning by arnica is common vinegar.

*Dose.* Of the Extract of Arnica, gr. v to gr. x. Of the Tincture of Arnica (arnica root ℥j, rectified spirit, Oj), the dose is ♏x to f℥ss.

*Dental Uses.* In dental practice, the tincture of arnica is applied to irritable pulps of teeth, in dental periostitis, to pre-

vent suppuration, to wounds of the mucous membrane of the mouth, combined with glycerine, to abraded surfaces caused by artificial teeth, and with tannic acid or glycerine of tannin, for ulcers of the mouth.

The tincture of arnica, when largely diluted with water, forms an efficient mouth-wash during operations upon the teeth.

DENTAL FORMULÆ.

*For Abraded Surfaces of the Mucous Membrane of the Mouth.*

℞. Tincturæ Arnicæ
Glycerini.....āā..... ℥j. M.
SIGNA.—To be used as a lotion.

*For Inflamed and Ulcerated Mucous Membrane.*

℞. Tincturæ Arnicæ..... ℥ij
Glycerini..... ℥ij
Aquæ Rosæ..... ℥ij
Aquæ Destillatæ..... ℥x. M.
SIGNA.—To be used as a gargle.

*For Ecchymosis.*

℞. Tincturæ Arnicæ..... ℥ss
Liquor Ammonii Muriat.... ℥ss
Aquæ..... ℥v. M.
SIGNA.—To be applied as a lotion.

## ATROPINÆ SULPHAS—SULPHATE OF ATROPINE.

### ATROPINE.

*Formula.* $C_{17}H_{23}NO_3$.

*Derivation.* Sulphate of atropine is obtained by adding a mixture of sulphuric acid to an ethereal solution of atropine. It is in the form of a white, slightly crystalline powder, very soluble in water and alcohol, but insoluble in ether. It is inodorous, and of a bitter taste.

*Medical Properties and Action.* Sulphate of atropine has the same medical properties and action as belladonna, but is far more energetic in its action. It is an active poison, and should only be administered internally with the greatest care. Hypodermically employed, it is a useful anodyne and antispasmodic, and the quantity should be cautiously increased from a very small dose in the beginning. Such symptoms as dryness of the throat, vertigo, and diplopia, are indications that its use should be discontinued. Without being a direct hypnotic, it

induces sleep by relieving pain. Although it is not so well tolerated, as a general rule, as is morphia, yet patients who cannot bear morphia will bear atropia.

*Therapeutic Uses.* See Belladonna.

*Dose.* Of Sulphate of Atropine, gr. $\frac{1}{120}$ to gr. $\frac{1}{60}$. For an anodyne and antispasmodic, hypodermically injected, the dose is ♏ij = gr. $\frac{1}{120}$, as a commencement. An ointment is made of atropine, gr. viij, rectified spirit, f℥ss, lard, ℥j.

The antidote in cases of poisoning by belladonna and its alkaloid is an infusion of galls and lime water, first evacuating the stomach as speedily as possible.

*Dental Uses.* In dental practice, sulphate of atropine is applied externally, to obtund the sensitiveness of inflamed pulps of teeth, preparatory to other treatment, and to their devitalization; it is also applied in acute inflammation, depending upon alveolar periostitis and abscess. It forms one of the ingredients of a nerve paste, for devitalizing pulps of teeth, being substituted for the acetate of morphia; in facial neuralgia, in the form of an ointment; in neuralgia and in profuse salivation. As an anodyne for internal use, it proves efficacious in relieving intense pain, such as may result from an inflamed pulp or periosteum; also internally, or in the form of hypodermic injections, for the relief of facial neuralgia.

## DENTAL FORMULÆ.

*For Facial Neuralgia.*

℞. Atropinæ Sulphat..... gr. j
Adipis..... ℥j. M.

SIGNA.—To be applied in the form of an ointment, over seat of pain.

*For Facial Neuralgia.*

℞. Pulveris Belladonnæ... ℥ x
Camphoræ..... ℥ ss
Spiritus Rectificati..... q. s. M.

SIGNA.—To be applied with a camel-hair brush.

*For Facial Neuralgia.*

℞. Ext. Belladonnæ..... gr. ss
Quininæ Sulphat..... gr. ij. M.
Ft. pil. No. 1.

SIGNA.—Use three times daily.

*For Facial Neuralgia.*

℞. Linimenti Belladonnæ
Linimenti Aconiti..āā.. ℥ vij
Chloroformi..... f℥ ij. M.

SIGNA.—To be applied as a lotion, on lint saturated with it, and covered with oiled silk.

*For Neuralgia.*

℞. Ext. Belladonnæ.....gr. iv
Ext. Stramonii.....gr. v
Ext. Hyoscyami.....gr. v
Quininæ Sulphat.....ʒ ij.
Ft. pil. No. xx.

SIGNA.—One pill two or three times a day.

*For Neuralgia in Superficial Nerves.*

℞. Chloroformi
Spts. Vini Rect....āā... ʒ ss
Atropinæ Sulphat.....gr. v. M.

M. SIGNA.—To be applied on lint to painful part, and covered with oiled silk.

## AURUM TERCHLORIDUM—TERCHLORIDE OF GOLD.

*Formula.* $AuCl_3$.

*Derivation.* The Terchloride of Gold is obtained by dissolving gold in *aqua regia* (three parts, by measure, of hydrochloric acid, and one of nitric acid), using gentle heat to hasten the solution, the acids employed being chemically pure. The solution is then evaporated to dryness, when ruby-red, prismatic crystals of the terchloride of gold result.

*Properties and Action.* Terchloride of Gold is very deliquescent, and is soluble in water, alcohol and ether. It possesses a disagreeable, styptic taste, reddens blue litmus paper, and will impart a purple stain to the skin, which may be removed by a solution of cyanide of potassium. It is readily decomposed by many metallic and non-metallic elements, and also by saline and organic compounds, on account of its elements being held together by a feeble affinity. It is escharotic and disinfectant, and its physiological effects are similar to those of corrosive sublimate. It is not used internally.

*Dental Uses.* In dental practice, the Terchloride of Gold, in the form of an aqueous, alcoholic, or ethereal solution, is employed for the purpose of obtunding the sensitiveness of dentine, for which it is a valuable application; and the ethereal solution possesses some advantages over the aqueous or alcoholic solutions, for such a purpose. To prepare an obtunding solution: "Dissolve the crystals of the gold in pure water; fill a test tube half full of the solution; then add an equal quantity of sulphuric ether, and agitate the mixture. Let it then rest a few minutes, when the ethereal solution will rise to the surface, and may be poured off into another tube or phial,

and securely stopped. It should be kept, as much as practicable, from the action of light and air. Applied to dentine, on pledgets of cotton, it acts like chloride of zinc, but more promptly and with less pain. Chlorine is more abundantly liberated during its action than from chloride of zinc, hence it is a better disinfectant than the latter." It has a fine yellow tint, and it is not absorbed by the dentine, but forms an insoluble compound with the gelatinous elements. As it is an irritant poison, care should be observed in its use. If not protected in a glass-stoppered bottle, the gold is precipitated in a metallic form.

## BELLADONNÆ FOLIA—BELLADONNA LEAVES. BELLADONNÆ RADIX—BELLADONNA ROOT.

### Deadly Nightshade.

*Source.* Belladonna is a perennial, herbaceous plant, found in Europe, the leaves and root being the medicinal portions.

*Medical Properties and Action.* Belladonna is anodyne and antispasmodic, its activity depending upon an alkaloid, *Atropine.* Belladonna, in small doses, is a valuable narcotic and anodyne stimulant, having, however, little or no influence on the circulation, or any of the secretions, except causing a peculiar dryness of the mouth and fauces. In larger doses, it causes dilatation of the pupils, giddiness, loss of vision, difficult deglutition, constriction of the throat, difficult articulation, increased action of the heart, quickened respiration, nausea, vomiting, diuresis, purging, and sometimes a red eruption. It is eliminated chiefly by the urine.

Opium is the antidote, or hypodermic injections of morphia. When applied to the eyebrows, belladonna causes dilatation of the pupils.

*Therapeutic Uses.* Belladonna is extensively employed, either alone or in combination with sulphate of quinia, in the treatment of neuralgia; also in mania, Bright's disease, epilepsy, lead colic, spasmodic affections, diseases of the cerebro-spinal system, as a preventive of scarlatina, night sweats of phthisis, etc.

*Dose.* Of powdered Belladonna, gr. ss to gr. j, daily; of the extract, gr. ¼ to gr. j; of the tincture, gtt. v to gtt. xx.

## BISMUTHI SUBNITRAS—SUBNITRATE OF BISMUTH.

*Formula.* $BiONO_3H_2O$.

*Derivation.* The metal Bismuth—*Bismuthum, Formula* Bi, from which the subnitrate is obtained, is found native in Europe and America, and generally in combination with sulphur and oxygen. It fuses at 476° F., and is brittle and pulverizable. It is employed in the dental laboratory for making fusible metal alloys for dies and counter-dies.

The Subnitrate of Bismuth is obtained by dissolving the metal bismuth in dilute nitric acid, and converting the nitrate thus formed into carbonate, by adding a solution of carbonate of sodium, which is then dissolved in nitric acid, and the nitrate of bismuth again formed, which is washed in water, and the nitric acid removed by ammonia. Such a process frees it from the arsenious acid which metallic bismuth generally contains. Subnitrate of bismuth is in the form of a heavy, white powder, with a faint acid odor and slightly metallic taste, and is insoluble in water. Large quantities are poisonous, with symptoms of arsenical poisoning.

*Medical Properties and Action.* Subnitrate of bismuth is sedative, astringent, and alterative. Owing to the formation of a sulphide, it coats the tongue black, and its continued use may give rise to the formation of a bluish-red line on the gums, similar to that resulting from the use of lead, except that the line is wider and deeper in color. In proper doses, it promotes the appetite and increases the digestive power. Being somewhat astringent, it affects the intestinal movements, and can be detected in the blood, urine, and other secretions.

*Therapeutic Uses.* Subnitrate of bismuth is employed in atonic dyspepsia, gastric irritations (milder forms), pyrosis, gastrodynia, ulcer of the stomach, diarrhœa from debility, etc., chronic laryngitis, epilepsy, ringworm (in form of an ointment ℥j to lard ℥j), chronic skin diseases, chlorosis, when iron is not

tolerated, etc., etc. If not well borne by the stomach, it may be combined with aromatic powder, or if alkalies are indicated, with chalk and magnesia.

*Dose.* Of Subnitrate of Bismuth, gr. v–x to ℥j, in powder or emulsion.

*Dental Uses.* Subnitrate of bismuth is a valuable internal remedy in aphthæ, *mercurial salivation*, painful ulcers of the mucous membrane of the mouth, vomiting, cholera infantum, and diarrhœa of children during painful dentition. It is best given in milk, and before meals.

DENTAL FORMULÆ.

*For Vomiting and Painful Digestion of Teething Children, Acidity and Pyrosis.*

BARTHOLOW.

℞. Bismuthi Subnitrat.....℥ iij
Acid. Carbol.....gr. ij–gr. iv.
Mucil. Acaciæ.....℥ j
Aquæ Menthæ Pip.....℥ iij. M.

SIGNA.—A tablespoonful for adults, and a proportionate quantity for children, three or four times a day.

*For Diarrhœa of Dentition*

℞. Bismuthi Subnitrat.....gr. lx
Extract Rhei Fluid.....gtt. viij
Syrup Rubus.....f ℥ ss
Elixir Aurantii.....f ℥ ss. M.

SIGNA.—A teaspoonful four to six times a day. Proper feeding—barley water, milk and lime water. Starchy food prohibited.

## CALCII HYPOPHOSPHIS—HYPOPHOSPHITE OF LIME.

*Formula.* $Ca_2PH_2O_2$.

*Derivation.* The salt, Hypophosphite of Lime, is obtained by boiling phosphorus in a mixture of hydrate of lime in boiling water, until phosphoretted hydrogen escapes, and phosphate and hypophosphite of lime are formed in the solution, which is then filtered and evaporated over sulphuric acid, when the salt is crystallized out in the form of white, pearly crystals, with a nauseous, bitter taste. It is soluble in six parts of water, but is insoluble in alcohol.

*Medical Properties and Action.* The Hypophosphite of Lime, with those of soda and potassa, are all included under the term "alkaline sulphites." Taken internally, they are readily absorbed, and are partially changed in the system into sulphates. They combine with acids to form salts, and they

dissolve albumen, and increase the formation of saliva. Being regarded as tonic, alterative, stimulant and nervine, they are employed in cases of debility, more especially where the phosphates are deficient, as they possess the therapeutic properties of phosphorus.

*Therapeutic Uses.* The different sulphites of lime, soda, and potassa, are employed in intermittent and malarious fevers, typhus fever, smallpox, and other exanthematous diseases, pyæmia, dyspepsia, neuralgia with nervous depression, anæmia, for which affection they are combined with iron and quinine; diphtheria, cystitis, phthisis, etc., etc. Externally, the sulphites are efficient as local applications (especially the sulphites of soda), in gangrenous and other ulcerations, diseases of the skin, etc. One or two ounces to the pint of water form a stimulant and deodorizing lotion, which is promotive of healthy action.

*Dose.* Of the hypophosphites, gr. iij to gr. xv, three times a day, in syrup.

*Dental Uses.* The hypophosphite of lime is the most eligible salt, but the different sulphites are often administered together, in the form of a syrup. Where there is nervous depression, as a result of trigeminal neuralgia, the hypophosphites prove serviceable. The hypophosphite of lime is recommended in the case of delicate children, where there is reason for believing the phosphate of lime, or the lime salts generally of the teeth, are deficient in quantity.

## CALENDULA—CALENDULA.

### Marigold.

*Source.* Calendula is a well known garden plant, sometimes growing wild, with a peculiar and rather disagreeable odor, and a bitter, rough, saline taste. Both the leaves and the flowers are employed.

*Medical Properties and Action.* It is slightly stimulant, diaphoretic, antispasmodic, sudorific, and emmenagogue, but is seldom used internally. It contains a bitter principle, known as *calendulin.*

*Therapeutic Uses.* Calendula has been employed in low forms of fevers, scrofula, jaundice, amenorrhœa, etc. Externally, it is used in the form of tincture—*Tinctura Calendula*—in its full strength or diluted, and is very serviceable in exercising a curative influence in the treatment of incised wounds and contusions, preventing inflammation and suppuration. Some writers consider it to be unequaled as a local application after surgical operations, as it promotes union by first intention. It is applied as a lotion on lint. It is also thought to be a preventive against gangrene and tetanus.

*Dose.* Of the Tincture of Calendula, f℥j to f℥ij.

*Dental Uses.* Calendula, in the form of tincture, is employed in dental practice as an application to wounded or irritated pulps of teeth, when partly exposed; also, after the extraction of teeth; wounds about the mouth; and for such uses, it proves a very useful remedy. A few drops added to a wine-glass of water, forms a soothing and efficient mouth-wash for the soreness resulting from the removal of salivary calculus; superficial inflammations of the mucous membrane of the mouth, etc.

## CALX—CALCIUM.

### Lime.

*Formula.* CaO.

*Derivation.* Lime is obtained by calcining limestone or chalk, until the carbonic acid is driven off. Lime is more soluble in cold than in hot water, and a compound of lime and sugar is more soluble in water than pure lime alone. Calcium is the metallic base of lime.

*Medical Properties and Action.* Quicklime is a powerful escharotic and irritant.

Liquor Calcis—*Lime Water.* It is prepared by adding cold water to freshly slaked lime, and the clear fluid poured off.

The officinal preparation consists of four troy ounces of saturated solution of lime in eight pints of distilled water. It is a colorless, inodorous liquid, possessing a disagreeable alkaline taste.

Exposure to the air causes it to gradually absorb carbonic acid, with the formation of insoluble carbonate of lime, and it should therefore be preserved in glass-stoppered bottles. The addition of liquorice or coriander seed will disguise its taste.

*Medical Properties and Action.* Lime water is antacid, astringent, antiseptic and detergent. It is applicable to all cases where antacids are indicated, and where an astringent effect is not objectionable.

*Therapeutic Uses.* Lime water is an excellent remedy in gastric irritation, accompanied with nausea and vomiting; also in dyspepsia, attended with vomiting of food; also in diarrhœa, after the inflammatory action has been relieved; also in glandular affections, as an alterative resolvent. Externally, as a wash for foul ulcers, diseases of the skin, and as an injection in gleet and leucorrhœa. Atomized inhalations have been found useful in diphtheria and membranous croup.

*Dose.* Of Lime Water, f℥ss to f℥iij or iv, several times a day. It may be mixed with an equal quantity of milk for internal use.

Lime Liniment—*Linimentum Calcis* (lime water, f℥viij, flaxseed oil, ℥vij), is a valuable application to burns, scalds, and in smallpox.

*Dental Uses.* In dental practice, lime water is a useful agent in the form of a gargle, where the secretions of the mouth are viscid and fetid, and especially where the teeth are soft in structure and exceedingly sensitive, owing to the condition of the oral fluids, and especially of mucous secretions, which act readily on teeth deficient in earthy constituents. For young patients, the use of lime water is very beneficial to the teeth, owing to an acid condition of the oral fluids, common to an early period of life. It is also useful where the teeth are very sensitive, on account of the recession of the gum and absorption of the process.

When lime water is applied to inflamed mucous membrane, or to suppurating surfaces, it arrests secretion. It is also useful in sickness and irritability of the stomach during dentition; also to relieve the superficial ulceration of the mucous

membrane of the mouth, caused by the acid eructations attending dyspepsia, in the proportion of one part of lime water to two or three of milk.

## CALX CHLORATA—CHLORINATED LIME.

### Chloride of Lime.

*Formula.* $CaCl_2O_2,CaCl_2$.

*Derivation.* Chloride of Lime is obtained by passing chlorine over hydrate of lime till saturation is effected. It is in the form of a grayish-white substance, either in powder or friable masses, dry or but slightly moist. It is readily soluble in water, and will absorb moisture when exposed to the air. It has a bitter, caustic taste, and a slight odor of chlorine.

*Medical Properties and Action.* Chloride of lime is a stimulant, deodorizer, disinfectant, antiseptic and bleaching agent. In small doses it increases the action of the secreting organs, and if long continued it acts specifically upon the lymphatic glandular system, causing the reduction or absorption of glandular and other tumors. In large doses it acts as an acro-narcotic poison, and its use should always be commenced in small doses, carefully increased, and discontinued when such symptoms as nausea, vomiting or giddiness appear. It is chiefly used as a disinfectant.

*Therapeutic Uses.* Solutions of chlorinated lime are employed locally in scarlet fever, diphtheria, aphthæ, gangrene; and it has been administered internally in scrofula, typhus, malignant scarlet fever, syphilis, etc.

*Dose.* Of Chloride of Lime, gr. j to gr. v, in solution, several times a day. As a wash, 1 part dissolved in 100 parts of water.

*Dental Uses.* Chloride of lime is employed in dental practice in the treatment of cancrum oris; one method of application being the introduction of the dry powder, with the point of the finger, to the ulcerated surface, and the mouth well washed out immediately afterwards; also, in the form of a gargle composed of 1 part of powdered chloride of lime to 30 parts of mucilage and 15 parts of syrup. Solutions of chlor-

ide of lime are also efficient in scorbutic and other ulcerations of the mouth. It is also employed to correct the fetor of the breath, in the form of a mouth-wash, prepared as a weak solution.

One of its most important uses in dental practice is as a bleaching agent, either alone or in combination with other substances, to restore the color of devitalized teeth. When chlorinated lime is employed for bleaching discolored teeth, a good quality should be obtained, and no steel instrument used for its introduction; wood or gold instruments are to be preferred, and the chloride should be perfectly dry, and have been kept so from the time it was made. An efficient bleaching preparation is composed of equal parts of dry chlorinated lime and tartaric acid, mixing them together dry, and adding a little of the acid at a time. When prepared, the mixture should be kept in a glass-stoppered bottle. For bleaching purposes, chlorinated lime is also combined with chloroform, in the form of a thin paste. When chlorinated lime, or its combinations, is introduced into the cavity of a tooth, it should be secured by a temporary filling of gutta percha, Hill's Stopping, or one of the zinc preparations, and be secured from passing beyond the foramen of the root, by a filling introduced near the apex of the root. More than one application may be required, after which the cavity should be thoroughly cleansed, and a temporary filling of the whitest shade of the oxy-chloride of zinc filling material be introduced and worn for some time, after which a more durable gold filling can be inserted.

## DENTAL FORMULÆ.

*For Gangrene of the Mouth—Cancrum Oris.*

BARTHOLOW.

℞. Calc. Chlorat..... ʒ ss
Mucilaginis..... ℥ ss
Aquæ destil..... ℥ iiiss. M.

SIGNA.—To be used as a lotion.

*For Fetor of the Breath.*

BARTHOLOW.

℞. Calc. Chlorat..... ʒ iij
Aquæ destil..... ℥ ij
Alcoholis..... ℥ ij
Ol. Rosæ.....gtt. iv. M.

SIGNA.—A teaspoonful in a tumblerful of water; used as a gargle.

## CAMPHORA—CAMPHOR.

*Formula.* $C_{10}H_{16}O$.

*Source.* Camphor is a concrete substance obtained from the camphor laurel, an evergreen tree of China, Japan and Formosa, by sublimation, the crude gum being purified by resublimation with quicklime. Refined camphor is in the form of large, circular cakes, one or two inches thick, and has a strong, penetrating, fragrant odor, and a bitter, pungent taste, attended with a slight sense of coolness. It is white, pellucid, and somewhat unctuous to the touch.

*Medical Properties and Action.* Camphor is anodyne, stimulant, refrigerant, diuretic, and diaphoretic. It increases the action of the heart and arteries, and renders the pulse softer and fuller; but such effects are very transitory, and are followed by depression. In large, but not over doses, it allays pain and spasm, and induces sleep. In over doses, it excites narcotic symptoms, with those of an irritant poison, and has proved fatal. It acts chiefly on the nervous system.

*Therapeutic Uses.* Camphor is administered in fevers of an asthenic type, acute inflammations, inflammation of the brain, delirium tremens, asthma, rheumatic and nervous headaches, diseases of the heart, hysteria, dysentery, diarrhœa, cholera, etc., etc. Externally as an anodyne in rheumatism, and as a discutient in chronic inflammatory affections; also, the powder as a snuff in coryza and influenza, and in the form of Camphor Liniment—*Linimentum Camphoræ*—(camphor 1 part, olive oil 4 parts).

Camphor Water—*Aqua Camphoræ*—(camphor gr. cxx, alcohol ♏ xl, carbonate of magnesia ℥ss, distilled water Oij).

Soap Liniment—*Linimentum Saponis*—(camphor ℥iv, oil of rosemary, f℥ss, alcohol Oij, water ℥vj) is an anodyne and gentle rubefacient for sprains, rheumatic and gouty pains.

Spirit of Camphor—*Spiritus Camphoræ*—(camphor ℥iv, alcohol Oij).

*Dose.* Of camphor in substance, gr. ij to gr. x, in form of

an emulsion, made of sugar, gum arabic, myrrh, and water. Of camphor water ℥j to ℥j; of spirit of camphor ♏v to ♏xx.

*Dental Uses.* In dental practice, the spirit of camphor is locally employed to allay the pain arising from the near exposure of the pulps of teeth; also the pain of sensitive dentine, and that following the extraction of teeth affected with periostitis; also to arrest the hemorrhage and allay the pain of wounded pulps of teeth. It forms an efficient anodyne when in the form of a strong solution of camphor in chloroform. Camphor has also been employed in the treatment of putrescent pulps of teeth.

Combined with creasote or carbolic acid, camphor is thought to have the power of modifying the escharotic action of these agents. For such a purpose, 20 grains of camphor are combined with 1 ounce of the creasote or carbolic acid.

The Oil of Camphor—*Oleum Camphoræ*—is preferred by some to answer such indications. Camphor also forms one of the ingredients of the celluloid base for artificial teeth, which is composed of pyroxylin, 100 parts, camphor, 40 parts, oxide of zinc, 2 parts, and vermillion, 0.6 part. With ether, camphor is also used as a local anæsthetic. A cataplasm of camphor, morphia and flaxseed, applied to the cheek, has been used for the relief of odontalgia.

DENTAL FORMULÆ.

*For a Local Anæsthetic.*

℞. Pulv. Camphoræ..... ℥ vj
Æther. Sulph..... f ℥ j. M.

Signa.—Apply to the gum over the tooth to be removed, until it turns white or becomes blanched.

*For a Local Anæsthetic.*

℞. Chloral,
Camphoræ.....āā..... ℥ ij
Morphiæ Sulph..... ℥ ss
Chloroformi..... ℥ j. M.

Signa.—Apply with camel's-hair brush, allow to dry and reapply as freely as is necessary to render part insensible to pain.

*For a Stimulant and Anodyne Lotion.*

℞. Spiritus Rosemarini..... ℥ j
Camphoræ..... ℥ j
Saponis Albæ..... ℥ iv. M.

Signa.—To be applied as a lotion.

*For a Local Anæsthetic.*

℞. Camphoræ..... ℥ j
Æther vel Chloroformi. ℥ ij. M.

Signa.—Apply with a camel's-hair brush.

*For Neuralgia.*

℞. Camphoræ,
Chlor. Hydratis āā equal parts. M.

Signa.—Apply as a lotion.

## CAMPHORA MONOBROMATA—MONOBROMATED CAMPHOR.

*Formula.* $C_{10}H_{15}BrO_2$.

*Derivation.* Monobromated Camphor is obtained by the action of bromine on camphor, and subsequent purification with animal charcoal and repeated crystallization. It is a colorless, crystalline substance, with the odor of camphor and turpentine, and a slightly bitter taste. It is insoluble in water, but soluble in alcohol and ether.

*Medical Properties and Action.* It produces a sedative effect upon the circulatory system, and especially upon the cerebro-spinal nervous system, and is also an antispasmodic.

*Therapeutic Uses.* Bromide of Camphor is employed as a sedative and antispasmodic, in affections of the nervous system, and where camphor is indicated, as in asthma, neuralgia, hysteria, delirium tremens, etc.

*Dose.* Of Bromide of Camphor, gr. ij to gr. x, for an adult.

*Dental Uses.* In dental practice, the Bromide of Camphor is employed as a sedative in convulsions of dentition, neuralgia, etc. For children suffering from the convulsions of dentition, gr. j of the bromide of camphor in acacia mucilage, and administered every hour, has been very serviceable in arresting the paroxysms.

## CAPSICUM—CAPSICUM.

### Cayenne Pepper.

*Source.* Capsicum is obtained from the tropics of both hemispheres, being the fruit of capsicum anuum, and of other species of capsicum. The crimson or yellow pods are dried and ground to powder, which has a bright red color, and an aromatic smell, with a bitter, acrid, burning taste. Its acrid, pungent qualities are due to a peculiar substance in the form of a thick, yellowish-red fluid, called *capsicine.*

*Medical Properties and Action.* Capsicum is a powerful stimulant, producing, when small doses are taken, a sensation of warmth in the stomach, and a general glow over the body. It promotes the digestive process, and stimulates the circula-

tion, and also the genito-urinary organs. In excessive doses, capsicum is an irritant poison.

*Therapeutic Uses.* It is employed in certain forms of dyspepsia, flatulent colic, scarlet fever, yellow fever, delirium tremens, opium habit, etc., etc. Externally or locally as a gargle, in putrid and other forms of sore throat, chronic inflammation of the fauces, hoarseness due to a relaxed condition of the vocal cords, relaxed uvula, and in poisoning by opium, belladonna and aconite, it has proved useful as a stimulant.

*Dose.* Of powdered capsicum, gr. v to gr. x, in pill. Of the tincture of capsicum—*Tinctura Capsici* (capsicum ℥j, to diluted alcohol Oij)—the dose is ♏x to f℥j. Of the infusion —*Infusum Capsici* (capsicum ℥ss; boiling water Oj—the dose is f℥ss. The infusion is also used as a gargle.

*Dental Uses.* In dental practice the tincture of capsicum is serviceable in acute dental periostitis, where it is necessary to hasten suppuration as quickly as possible, on account of the increasing severity of the attack—a solution composed of gtt. xxv, in a glass of warm water, of which a mouthful is to be retained for some minutes.

Tincture of capsicum is also useful in chronic dental periostitis, to resolve the inflammatory products. It is also used to stimulate the gums and mucous membrane of the mouth in chronic inflammation and ulceration, and for looseness of the teeth as a result of salivation; also in cases of turgidity and puffiness of the gums. It is often serviceable in chronic alveolar abscess, as an injection, after the sac has been destroyed; also in recession of the gums from the necks of the teeth, for the purpose of stimulating them. A few drops added to a solution of aromatic sulphuric acid will prove serviceable in caries of the maxillary bones and in disease of the antrum. An efficacious stimulant gargle may be made of the tincture of capsicum, ℥ss, to rose water, ℥viij.

## CARBO ANIMALIS PURIFICATUS—PURIFIED ANIMAL CHARCOAL.

*Source.* Animal charcoal, called "bone black," is obtained by exposing bones to a red heat, protected from the air. It consists of charcoal, phosphate and carbonate of lime.

PURIFIED ANIMAL CHARCOAL—*Carbo Animalis Purificatus*—is obtained by digesting bone black in hydrochloric acid and water at a moderate heat, when it is dried and heated to redness in a covered crucible.

*Properties and Action.* Animal charcoal is an absorbent, and is used to counteract the effects of poisonous agents, such as the alkaloids and acids.

*Dose.* Of animal charcoal as an absorbent, ℥ss, to neutralize the effects of each grain of such agents as strychnia and morphia.

## CARBO-LIGNI—WOOD CHARCOAL.

*Source.* Wood charcoal is obtained by subjecting soft wood to a red heat with but a limited supply of air, by which the water, etc., are removed, allowing the carbon to remain.

*Properties and Action.* Wood charcoal is antiseptic and disinfectant and detergent, and is very serviceable in correcting the fetor of discharges and arresting the progress of ulceration, especially when in the form of the dry powder, or mixed with linseed as a poultice.

*Therapeutic Uses.* For foul and gangrenous ulcers, gangrene, phagedæna, suppurating surfaces, cancerous tumors, etc., etc.

*Dental Uses.* The powdered charcoal added to water, in the proportion of one or two drachms to a glass of water, forms an efficient disinfectant gargle for the offensive fetor of mercurial stomatitis; also useful in foul and gangrenous ulcers of the mouth, diseased gums, offensive ulcerations, offensive fetor of cancrum oris, etc., etc. Nothwithstanding its detergent properties, injury results from its use as a dentifrice, on account of its tendency to cause recession of the gums from the necks of the teeth.

## CARVACROL—CARVACROL.

*Source.* The caraway plant, a native of Europe.

*Derivation.* Carvacrol is a product of the essential oil of caraway, which is obtained from the seeds of the plant. Caraway—*carum*—seeds are of a light yellow color, with a pleasant aromatic smell, and a sweetish, warm, spicy taste. They are stomachic and carminative, and are occasionally used in flatulent colic, as a corrective of other medicines. The volatile oil of caraway is most employed in doses of gtt. j to gtt. x. CARVACROL is obtained by treating the oil of caraway with iodine, and washing the product with potassa, when it is mixed with carvene, which is one of the liquid oils of caraway. Carvacrol is also found among the products of the action of iodine on camphor. When pure it is a colorless, viscid oil, lighter than water, in which it is nearly insoluble. Its odor is like that of creasote, and its taste is persistent, strong and acrid.

*Medical Properties and Action.* Carvacrol is antiseptic, carminative, disinfectant and escharotic. Combined, it forms an efficient gargle in inflammatory conditions. It is not employed internally.

*Dental Uses.* In dental practice, Carvacrol has been employed as a substitute for creasote, carbolic acid, and glycerole of thymol, in the treatment of odontalgia, sensitive dentine, alveolar abscess, and as an antiseptic in the pulp canals of teeth; also, as a gargle in inflamed and ulcerated conditions of the mucous membrane of the mouth, tonsillitis, etc. Combined with water, in the proportion of 3 drops to the ounce, it forms an efficient gargle in stomatitis, tonsillitis, etc.; the strength of the solution may be increased, when a more powerful action is required. It is also employed with advantage in sensitive cavities of the teeth, in operating with the dental engine, to lessen the pain from friction of the instrument. As an application in odontalgia, from an exposed and irritable pulp, it affords almost instantaneous relief. It is claimed for Carvacrol, that it is not so liable to cause inflammation as creasote; especially when it is applied through the pulp canals.

When employed to obtund the sensitiveness of dentine, it is necessary to confine it in the cavity of the tooth for a few days, by means of a temporary filling of zinc preparation, as it readily dissolves Hill's Stopping and gutta percha. When it is used in the form of an injection in alveolar abscess, a sharp, burning sensation is experienced as soon as it reaches the seat of the affection, when the crown cavity of the tooth should be immediately closed.

In patients of a scrofulous diathesis, it is necessary to exercise care in the use of carvacrol. When applied to cavities before the introduction of the filling, and to exposed pulps, it is introduced on a pellet of cotton.

## CHLORAL—CHLORAL.

### Chloral Hydras—Hydrate of Chloral.

*Formula.* $C_2HCl_3OH_2O$.

*Derivation.* Chloral is obtained by the action of dry chlorine gas on absolute alcohol, and is purified by sulphuric acid and a small quantity of lime; a small quantity of water converts it into solid crystalline hydrate of chloral. It is in the form of a snow-white, crystalline mass, with a pungent odor and taste, soluble in its own weight of distilled water, and very soluble in alcohol. When heated, it fuses and evaporates, leaving no residue, and in the air without combustion.

*Medical Properties and Action.* Hydrate of Chloral is hypnotic and anæsthetic, possessing more of the former and less of the latter property than chloroform, and, unlike chloroform, after its administration there is no elimination by the breath or urine. It diffuses into the blood rapidly, causing an abundant flow of saliva, and a cooling sensation in the stomach, followed by warmth. Very large quantities cause a high degree of gastric irritation, nausea and vomiting. Taken in moderate quantity, it stimulates the appetite, and produces muscular relaxation. It is uniformly certain in its action as an hypnotic, has no depressing influence, and does not cause constipation. Administered in doses of gr. x to gr. xxx, it causes uncon-

sciousness to pain, and a profound sleep, lasting over several hours. The sleep it produces is quiet and gentle, and induced without distress. Liebreich claims to have produced sleep which lasted from five to fifteen hours, with from 25 to 30 grains of hydrate of chloral.

The habitual use of chloral leads to a disorder which is somewhat similar to the "opium habit," although it may not be as persistent. When there is present no susceptibility to its hypnotic action, it is liable to cause headache, and in some cases, a delirious excitement. Its hypnotic action is immediately preceded by a stage of excitement, generally of short duration, which is followed by sudden and complete sleep, very much like natural sleep, calm, dreamless and refreshing. It differs from a condition of narcotism from the fact that the patient can be easily roused to partake of nourishment, and will readily fall asleep again.

There are no unpleasant after-effects resulting from a moderate dose of chloral, differing in this respect from morphia, which often causes headache, faintness, giddiness, nausea, and constipation. Chloral is not capable of producing insensibility to pain, unless the quantity administered is sufficient to suspend the functions of the cerebrum.

When a proper dose is administered, the pupil contracts slightly, but the pulse may remain unaltered or become slower, and the respiration unaffected. When an improper or dangerous dose is taken, profound narcotism ensues, the respiration becomes slower, the pulse weak, rapid and irregular, sensibility is lost, all reflex movements are impossible, and complete muscular relaxation follows. It destroys life by the suspension of the functions of the cerebrum, and by paralysis of the respiratory centre, and of the cardiac ganglia; also death may suddenly follow by paralysis of the heart, in cases of fatty degeneration, and the lower lobes of the brain remain unaffected. The paralytic phenomena caused by chloral are due to its direct action on the nervous centres. The congestion of the meninges of the brain and cord, and distention of the right cavities of the heart, have been observed after poisoning by chloral. The

antidote in cases of poisoning is strychnia, and the same treatment as in opium poisoning.

*Therapeutic Uses.* The most important uses of chloral are in diseases of the nervous system, such as delirium tremens, insanity, tetanus, acute mania, neuralgia, chorea, whooping cough, and in rheumatism, cholera morbus, sea sickness, etc., etc. Having no direct pain-relieving power, except by suspending the functions of the cerebrum and in dangerous doses, sleep can be procured and pain relieved by combining the chloral with morphia, when it is very effective.

*Dose.* Of Hydrate of Chloral, gr. v to ℈j; but it must be remembered that one-half drachm has produced poisonous symptoms. Thirty grains of hydrate of chloral are equal in effect to gr. j of opium. For adults, if short intervals of sleep are required, from gr. xxv to gr. xxx will answer; for young children, gr. vij is the dose recommended. Moderate and frequently repeated doses are better than a single large one.

*Dental Uses.* In dental practice, the hydrate of chloral, in the form of from gr. ss to gr. j, is applied to inflamed pulps for the relief of odontalgia, and is an efficient remedy; it is also employed for the relief of neuralgia of the fifth pair of nerves; as a stimulant and deodorizing application to foul and fetid indolent ulcers; also as a local anæsthetic, for this purpose being combined with camphor and other agents (see Aconite), (see Camphor); also as an anodyne, for the relief of the pain of dental periostitis; and as an injection, for alveolar abscesses. Although it is employed hypodermically, yet painful phlegmons have resulted from its repeated application.

DENTAL FORMULÆ.

*For Foul and Fetid Indolent Ulcers.*

℞. Chloral Hydratis.....gr. x
Aquæ Destillatæ.....f ℥j. M.

SIGNA.—To be applied as a lotion.

*For a Local Anæsthetic.*

℞. Chloral Hydratis.. .....℥ ij
Pulveris Camphoræ..... ℥ ij. M.

SIGNA.—To be applied as an obtunding mixture, by means of an applicator.

*For Foul and Fetid Indolent Ulcers.*

℞. Chloral Hydratis... ..... ℥ ss
Adipis ..... ℥ j. M.

SIGNA.—To be used as an ointment.

*For a Hypnotic.*

℞. Chloral Hydratis..... ℥ ij
Syrupi Aurantii Floris... ℥ iv
Syrupi Tolutani..... ℥ iv
Aquæ Destillatæ..... ℥ vj. M.

SIGNA.—Dose, ⅙ part, largely diluted

*For Odontalgia—Pulpitis.*

FLAGG.

℞. Chloral Hydratis.....ʒ iij
Aquæ Destill.....f ʒ j. M.
SIGNA.—Apply on cotton.

*For Neuralgia.*

℞. Chloral Hydratis.....partes 3
Camphoræ.....partem 1. M.
SIGNA.—To be applied over seat of pain.

*For a Local Anæsthetic.*

℞. Chloral Hydratis,
Pulveris Camphoræ.āā. ʒ ij
Morphiæ Sulph..... ʒ ss
Chloroformi..... ʒ j. M.
SIGNA.—Apply with camel's-hair brush; dry rapidly, and reapply.

## CHLORINIUM—CHLORINE.

*Derivation.* Chlorine is a greenish-colored gas, of a penetrating and suffocating odor, very persistent and characteristic. It is soluble in water, in the proportion of two volumes of the gas to one of water, and is a supporter of combustion. It is generated from black oxide of manganese, hydrochloric acid and water, is an active irritant, and, when breathed, excites cough, a sense of suffocation and irritation of the mucous membrane of the nostrils and bronchial tubes, and, when considerable quantities are inhaled, it induces spitting of blood, violent pains, and sometimes death. It is a deodorizer and disinfectant, and has been used to destroy disease germs and offensive effluvia.

CHLORINE WATER—*Aqua Chlori*, is an aqueous solution of chlorine, formed by passing the gas through water. It is a greenish-yellow liquid, with an astringent taste, and the suffocating odor of chlorine gas. It should be kept in glass-stoppered bottles, in a cool place, and protected from the light.

*Therapeutic Uses.* Chlorine Water is used internally in malignant fevers, such as scarlet fever, typhus, and in diphtheria, aphthæ, gangrene, syphilis, diseases of the liver, skin diseases, etc.; and as an antidote for hydrocyanic acid. The poisonous effects of chlorine gas may be prevented by ammoniacal gas, and albumen is the antidote for chlorine water, given freely, in the form of milk, flour, eggs, etc.

*Dose.* Of Chlorine Water, f ʒ j to f ʒ iv, diluted.

*Dental Uses.* Chlorine Water is employed in dental practice,

as a local application in gangrene of the mouth and fauces, aphthæ, cancrum oris, and fetor of the breath. Chlorine gas has been employed to bleach discolored teeth, care being taken that it reaches no other part than the cavity of the tooth undergoing such treatment, which may be accomplished by the application of a large rubber dam, such as is used in the operation of filling teeth.

DENTAL FORMULÆ.

*For Aphthæ and Gangrene of the Mouth.*

℞. Aquæ Chlori..... ℥ss
Aquæ Destillatæ..... ℥iiiss
Syrupi Simp..... ℥ss. M.

SIGNA.—To be used as a gargle or lotion.

*For Aphthæ, Stomatitis, and Cancrum Oris.*

℞. Liquoris Chlori
Mellis.....āā..... ℥ij. M.

SIGNA.—To be applied as a lotion.

*For Fetor of the Breath and an Antiseptic.*

℞. Liquoris Chlori..... ʒiv
Mellis..... ʒiv
Aquæ Destillatæ..... ℥x. M.

SIGNA.—To be used as a gargle.

*For Mercurial Stomatitis.*

℞. Liquoris Chlori....part. j
Aquæ Destillatæ...part. viij. M.

SIGNA.—To be used as a gargle for correcting the fetor, and diminishing slightly the discharge.

## CHLOROFORMUM—CHLOROFORM.

*Formula.* $CHCl_3$. Sp. gr. 1.480.

*Derivation.* Chloroform is obtained by the distillation of alcohol with chlorinated lime. The form for medicinal use (*Chloroformum Purificatum*) is purified by agitation with sulphuric acid, which frees the crude chloroform from such deleterious agents as chlorinated pyrogenous oil; the lighter liquid is then separated, and carbonate of sodium, previously dissolved in water, is added to it. The mixture is then agitated, the chloroform separated from the supernatant layer, alcohol mixed with it, and lime in coarse powder added. It is a colorless, volatile liquid, of an agreeable ethereal odor, and a hot, aromatic, sweet taste. It is slightly soluble in water, and dissolves very readily in alcohol and ether in all proportions. The boiling point is 142° F. The purest form of chloroform has a specific gravity of 1.5022, while the officinal contains a little alcohol; it is a terchloride of formyl. The purest chloroform for internal use is obtained from the hydrate of chloral. The purity of chloroform may be ascertained by agitating it with

the binitro-sulphuret of iron, which shows the presence of alcohol, by the production of a brown tint; chlorinated pyrogenous oil may be detected and removed by strong sulphuric acid, which gives the solution a yellowish or reddish-brown color, if such an impurity is present.

*Medical Properties and Action.* Chloroform, when inhaled, is an anæsthetic; and, when administered internally, is anodyne and antispasmodic. Its effects on the system are similar to those of ether, but more powerful and more rapidly produced, and it requires more care in its administration, both internally and by inhalation of the vapor. Undiluted, it excites great irritation and inflammation of the mucous membrane, and the vapor, passing through the fauces in quantity, may enter the larynx and cause great heat, inflammation and even œdema. When taken internally it causes a feeling of warmth in the stomach, followed by coldness, similar to ether, and if taken in large quantity, undiluted, it acts as an irritant poison, inducing violent gastritis. It is diffused into the blood, and affects remote parts. It increases the action of the circulatory system, producing excitement of the brain, followed by a deep, heavy sleep; and in poisonous doses, stupor and insensibility. The first effect of the inhalation of the vapor of chloroform, is a feeling of warmth and excitement extending to the extremities, which is succeeded by noises in the ears and a vibratory thrilling and benumbing sensation throughout the body, followed by loss of feeling, motion and consciousness, with general paralysis of the respiratory muscles, stertorous breathing, quick pulse, which may become irregular and weak, owing to the sedative action on the heart. The pupils, at first contracted, become dilated, and there is complete relaxation of the muscular system.

[As the physiological actions and mode of administration of chloroform and ether are similar, the reader is referred to the article on Sulphuric Ether.]

*Therapeutic Uses.* Besides its use as a general anæsthetic agent, chloroform is internally administered in substance, as an anodyne and antispasmodic, for non-inflammatory affections,

such as nausea and vomiting, sea-sickness, sick headache, flatulent colic, intermittent fevers, and in cholera, for which it is very efficient. The vapor is employed for the relief of hay asthma, whooping cough, spasmodic asthma, and as an hypnotic in delirium tremens, and as an injection and lotion in neuralgia, and as a counter-irritant or vesicant, for which purposes it is applied to the skin, and evaporation prevented. Great care is necessary in the administration of chloroform in substance, as fatal effects have followed such use; 15 drops have destroyed life. Externally, chloroform is employed as a stimulating application to foul and indolent ulcers

*Dose.* Of Chloroform, ♏j to v, in sweetened water or mucilage. Dose of Chloroform for Inhalation, ℥j to ℥ij.

Spirit of Chloroform—*Spiritus Chloroformi*—is composed of chloroform, ℥j; diluted alcohol, ℥ij. Dose of Spirit of Chloroform, ℥ss to ℥j.

*Dental Uses.* Chloroform is employed, in dental practice, as a general anæsthetic; also as a local anæsthetic, for which purpose it is generally combined with other agents; as an anodyne and antispasmodic, either locally applied, or the vapor inhaled, as in the treatment of convulsions of dentition, for which it is a very efficient remedy.

## DENTAL FORMULÆ.

*For a Local Anæsthetic.*
Von Bonhorst.

℞. Chloroformi,
Ætheris Sulph.,
Spiriti Lavandulæ,
Pyrethri (Fluid Ext.) āā f℥j. M.

Signa.—Apply for one or two minutes to gum over root of tooth to be extracted.

*For a Local Anæsthetic.*

℞. Chloroformi purificati,
Tincturæ Aconiti,
Alcoholis.....āā.....f℥j
Morphinæ Sulphat.....gr. vj. M.

Signa.—To be applied to gum over root of tooth to be extracted.

*For an Anodyne Application in Neuralgia.*

℞. Chloroformi.....f℥j
Linimenti Camphoræ...f℥ij. M.

Signa.—To be applied over seat of pain, and covered with oiled silk, to prevent evaporation.

*For Neuralgic Affections of the Teeth.*

℞. Chloroformi.....f℥j or i
Aquæ.....Oj. M.

Signa.—To be used as a wash or gargle.

*For Neuralgic Affections.*

℞. Chloroformi ..... ℥ ij
Camphoræ..... ℥ jss
Olei Olivæ..... ℥ ij. M.

SIGNA.—To be applied as a liniment over seat of pain.

*For a Local Anæsthetic.*

℞. Chloroformi..... part. xx
Acidi Acetici (Cryst.)... part. j. M.

SIGNA.—Apply with camel's-hair brush, or by applicator.

*For Odontalgia—Pulpitis.*

℞. Chloroformi..... ℥ ij
Alcoholis..... ℥ j
Æther..... ℥ ss
Camphoræ (Pulv.)..... ℥ ss
Tinct. Opii..... ℥ ss
Oleum Caryophilli..... ℥ j. M.

SIGNA.—Apply on cotton wool to exposed pulp.

*For Neuralgic Affections.*

℞. Chloroformi,
Spiriti Ammoniæ,
Tincturæ Aconiti..āā..f ℥ ij
Olei Ricini..... ℥ ij
Linimenti Saponis.....f ℥ j. M.

SIGNA.—To be applied as a liniment over seat of pain.

*For Earache of Dentition.*

℞. Chloroformi..... ..... ℥ j
Oleum Olivæ..... ℥ j. M.

SIGNA.—Pour from gtt. x to xx in ear, and close orifice with cotton.

*For Odontalgia—Pulpitis.*

℞. Chloroformi,
Tinct. Aconite....āā....f ℥ iij
Tinct. Capsici..... f ℥ j
Tinct. Pyrethri,
Oleum Caryoph...āā... f ℥ ss
Camphoræ (Pulv.)..... ℥ ss. M.

SIGNA.—Apply on cotton wool.

## CINCHONA FLAVA—YELLOW CINCHONA.

### CALISAYA BARK, PERUVIAN BARK.

*Source.* Cinchona is the bark of the tree cinchona calisaya, which grows on the western coast of South America, especially of Bolivia and Southern Peru. Different varieties are named, according to their color, as *Cinchona Flava*, yellow cinchona; *Cinchona Pallida*, pale cinchona; *Cinchona Rubra*, red cinchona. The medicinal properties of these barks depend upon the alkaloids they contain in varying proportions, *Quinina* being the most important.

*Medical Properties and Action.* The yellow bark has a much more bitter taste than the others, but is comparatively free from acidity. It is brownish yellow, the powder being of an orange color, and it contains more of the alkaloid quinine than the other barks.

Cinchona is tonic, astringent and antiperiodic, and the different varieties owe their tonic and antiperiodic properties to

the alkaloids *quinina*, *cinchonina*, and *cinchonidina*. On account of the large quantity of the powdered barks it is necessary to take in order to obtain the full effects, and which cause, in some cases, derangement of the stomach, vomiting, headache and constipation, the alkaloid quinine, in the form of sulphate of quinina, is preferable.

Sulphate of Quinina—*Quininæ Sulphas*, is prepared by boiling the yellow bark in water acidulated with hydrochloric acid, by which the alkaloid is separated from its combination with kinic and other acids, to form a soluble hydrochlorate. This salt is decomposed, and the quinine is precipitated by the addition of lime, and afterwards washed in boiling alcohol.

Sulphate of quinine is in the form of colorless, very light and silky crystals, and is readily soluble in alcohol, and in water acidulated with sulphuric acid. It is insoluble in ether, and requires 740 parts of cold, or 30 parts of boiling, water to entirely dissolve it.

Cinchona is also antiseptic, as the powder dusted over unhealthy wounds will arrest putrefaction, and promote healthy cicatrization. Quinina will destroy minute organisms, and preserve substances from decomposition. The cinchona alkaloids are readily diffused into the blood, and when hypodermically injected, are absorbed by the blood. Cinchona and its alkaloids increase the action of the heart slightly, but, in large doses, quinine depresses the heart's action and enfeebles the pulse. As quinine accumulates in the brain, a sense of fullness in the head, a tightness and constriction about the forehead, a ringing in the ears (*tinnitus aurium*), giddiness and vertigo, are experienced. Deafness also occurs, as the effect of considerable doses, and, if continued, permanent injury may result. Poisonous doses cause intense headache, dilated pupils, delirium, coma, and convulsions.

Peruvian bark and its alkaloids are the most reliable tonics and antiperiodics.

*Therapeutic Uses.* Cinchona, and its alkaloid quinine, are internally employed in the treatment of intermittent fevers, and also other fevers, such as remittent, typhus, puerperal and

scarlet; in influenza, neuralgias of a malarial origin, acute rheumatism, phthisis, advanced stages of pneumonia and pleurisy, erysipelas, urticaria, diseases of the eye, epilepsy, gangrene and mortification, scurvy, pyæmia, malarial dysentery, passive hemorrhages, and as an anthelmintic, etc., etc.

*Dose.* Of powdered Cinchona, ℈j to ʒiij, given in infusion of liquorice; of the extract of cinchona, gr. j to gr. x, in pill; of sulphate of quinine, gr. j to ℈j.

*Dental Uses.* Cinchona and its alkaloid quinine are employed in dental practice, in the treatment of neuralgia of the fifth pair of nerves, when due to malaria, in from five to ten grain doses of quinine; in aphthous ulcerations, in one or two grain doses every two or three hours, especially when there is great debility; and in cancrum oris; also in the form of gargles and lotions, in gangrenous ulcerations of the mouth. Cinchona is also employed in the form of powder, as an ingredient of certain dentifrices, for its tonic and antiseptic properties.

DENTAL FORMULÆ.

*Dentifrice.*

℞. Pulv. Cinchonæ Flav... ʒ iij
Cretæ Prep..... ʒ iij
Sacchari Albi..... ʒ j
Pulv. Cinnamon..... ʒ j
Pulv. Saponis Cas. Albi. ʒ ij
Pulv. Myrrhæ..... ʒ j. M.

*Dentifrice.*

℞. Pulv. Cinchonæ Flav... lb ss
Cretæ Prep..... lb ss
Pulv. Myrrhæ..... ʒ iv
Pulv. Radicis Iridis..... ʒ iv. M.

*For Ulceration of Gums.*

℞. Pulv. Cinchonæ..... ʒ ii
Cupri Sulph..... gr. x
Acaciæ (Pulv.).. ..... ʒ j
Mellis..... ʒ ij
Aquæ Puræ..... ʒ iij. M.

SIGNA.—Apply with camel's-hair brush to ulcerated surface of mucous membrane.

*Dentifrice.*

℞. Pulv. Cinchonæ Flav... ʒ iv
Pulv. Saponis Cas Albi. ʒ iv
Cretæ Prep..... ʒ ij
Magnesiæ Calc..... ʒ iij
Otto Rosæ..... gtt. viij
Olei Caryophilli..... gtt. vj. M.

*For a Wash after the Extraction of Teeth.*

℞. Cinchonæ (Decoct.)..... f ʒ ij
Aluminæ ..... ʒ ij
Infus. Rosæ..... f ʒ ij. M.

SIGNA.—Use as a gargle.

*For Mercurial Stomatitis.*

GARRETTSON.

℞. Tinct. Cinchonæ..... ʒ ij
Potassæ Chloratis..... ʒ ss
Sodæ Bibor..... ʒ ij
Aluminis Pulv..... ʒ ij
Potassæ Permanganatis gr. xxv
Aquæ Coloniæ..... ʒ j
Tinct. Myrrhæ.. ..... ʒ j
Tinct. Capsici..... ʒ j
Tinct. Krameriæ..... ʒ j
Aquæ ..... ʒ viij M.

SIGNA.—Use as a gargle.

## CINNAMOMUM—CINNAMON.

### Cassia Bark.

*Source.* The best variety of cinnamon is obtained from Ceylon, and is the prepared bark of a tree of the natural order *Lauraceæ.*

It is in the form of long, cylindrical pieces, thin, smooth, and of a yellow-brown color, with a fragrant odor, and a warm, sweetish, aromatic, and slightly astringent taste. It contains a volatile oil, a slight amount of tannic acid, an acid peculiar to itself, *cinnamic acid*, mucilage, lignen, etc.

*Medical Properties and Action.* Cinnamon is an aromatic stimulant and astringent, being more powerful as a local than as a general stimulant. Its medicinal virtues principally reside in a volatile oil, oleum cinnamomi.

*Therapeutic Uses.* Cinnamon is chiefly used as an adjunct to other medicines, being seldom prescribed alone, though it is capable of allaying nausea and vomiting, and also relieving flatulence. Combined with chalk and with other astringents, it is well adapted for the treatment of diarrhœa.

*Dose.* Of Cinnamon, gr. x to ℥ss of the powder; of the tincture, the dose is f℥j to f℥iij.

Oil of Cinnamon—*Oleum Cinnamomi*, is obtained by distillation, and, when fresh, is of a light yellow color, which becomes deeper by age, and ultimately red. It has an excessively hot, pungent taste. It is often employed to conceal the taste of other medicines, and is a powerful local stimulant. Large doses of the oil of cinnamon are poisonous, producing an inflamed and corroded condition of the gastric and intestinal mucous membrane.

*Dose.* Of the Oil of Cinnamon, gtt. j or gtt. ij, administered in the form of an emulsion.

Cinnamon Water—*Aqua Cinnamomi*—(cinnamon, carbonate of magnesia, and distilled water), is used as a vehicle for other medicines.

Spirit of Cinnamon—*Spiritus Cinnamomi*—(oil of cinnamon, 1 part, stronger alcohol, 15 parts). Dose, gtt. x to gtt. xx.

*Dental Uses.* Cinnamon, in the form of powder, is employed as an ingredient of dentifrices, for its stimulant, astringent and aromatic properties. Oil of Cinnamon is employed in dental practice for the relief of odontalgia. One drop applied to an inflamed dental pulp will afford temporary relief.

## COLLODIUM—COLLODION.

*Derivation.* Collodion is a solution of 4 parts of pyroxylin in 70 parts of stronger ether and 26 parts of alcohol. Pyroxylin, or gun cotton, is prepared by adding a mixture of nitric and sulphuric acids to cotton freed from impurities.

Collodion is a colorless, syrupy, and very inflammable liquid, with a strong ethereal odor. By long standing and exposure, or when applied to a surface, it deposits a thin, transparent and strongly contractile film, which is insoluble in water or alcohol. It should be kept in glass-stoppered bottles. It is applied by means of a camel-hair brush. When it becomes too thick, it may be diluted by a solution constituted of ether, 3 parts, alcohol, 1 part.

*Medical Properties and Action.* It is serviceable as an emollient, and its action is mechanical, as it draws together and holds in apposition divided parts, and protects such, as well as abraded or denuded surfaces, from contact with the air. As the ether it contains evaporates, the surface of the part to which it is applied is constringed, and a degree of pressure is thus established, which is very useful in moderating vascular action, promoting absorption, and changing the course of pus which may already be formed into a direction more desirable. On account of the liability of collodion to crack and peel off, these objections have been obviated by the use of what is known as FLEXIBLE COLLODION—*Collodium Flexile*—(collodion, 92 parts, Canada turpentine, 5 parts, castor oil, 3 parts), which is softer and more pliable and elastic.

*Therapeutic Uses.* Collodion is very useful in ulcers, fissures, incised wounds, abraded surfaces, erysipelas, skin diseases, etc.

*Dental Uses.* Collodion is a very useful application in dental

practice, to prevent alveolar abscesses from discharging externally on the face; for such a purpose, it is applied in successive layers, so as to act as a compress, and, by moderating the vascular action, cause absorption, or such a change in the direction of the discharge as will induce it to open in the mouth. It is also employed in combination with carbolic acid, as an application for odontalgia; when introduced on cotton, it acts as a temporary filling; it has also been employed for arresting the mucous secretion during the operation of filling cavities near to or under the margin of the gum, but the rubber dam has superseded its use in this respect. Combined with iron and other agents, it forms a styptic preparation.

In the dental laboratory, collodion, in the form of a colored preparation, is employed to coat the surfaces of the plaster models of plastic work, and when not applied too thick, it protects the plaster surface, and also prevents an unsightly rubber surface on the part of the plate which is adapted to the mucous surface of the mouth. When this preparation becomes too thick for use, it may be diluted with a solution of 3 parts of ether to 1 part of alcohol.

CANTHARIDAL COLLODION—*Collodium cum Cantharide*, is composed of cantharides (Spanish flies), in powder, 60 parts, flexile collodion, 85 parts, commercial chloroform, q. s. The addition of one per cent. of Venice turpentine to cantharidal collodion will prevent the disagreeable, and, at times, painful contraction of the preparation on drying.

Like cantharides, cantharidal collodion, when locally applied, excites inflammation of the skin and mucous membrane, which terminates in a copious secretion of serum under the cuticle. It produces a blister in the same time as the ordinary blistering plaster, and is applied with greater facility, and is better adapted to cover uneven surfaces, and retains its place more certainly. It acts much more readily if the evaporation of the ether is restrained by a piece of oiled silk placed over the surface immediately after the application of the collodion.

*Dental Uses.* Cantharidal collodion is a valuable application in dental periostitis, applied to the gum over the root of the

affected tooth, by means of a camel-hair brush, previously removing all moisture from the surface, and protecting the lips and cheeks, until the ether it contains has evaporated, and an artificial cuticle is formed. The blister which rises on the gum should be punctured with a needle. The counter irritation thus produced relieves the periosteal inflammation.

IODIZED COLLODION—*Collodium Iodidum*—(collodion, ℥j, iodine, gr. xx), forms a good solution of iodine for external use.

DENTAL FORMULÆ.

*For Odontalgia.*

℞. Acidi Carbolici Cryst.,
Collodii .....āā..... ℥j. M.

SIGNA.—To be applied on cotton.

*For a Styptic.*

℞. Collodii.....partes 100
Acidi Carbolici...partes 10
Acidi Tannici....partes 5
Acidi Benzoici...partes 5. M.

SIGNA.—To be applied to the bleeding surface by means of a camel-hair brush.

*For a Styptic.*

℞. Collodii..... ℥ iij
Tinct Ferri Perchloridi. ℥ j
Olei Ricini.....gtt. ij. M.

SIGNA.—To be applied to the bleeding surface, or, on cotton, to the alveolar cavity.

*For a Styptic.*

℞. Acidi Tannici,
Alcoholis,
Ætheris.....āā.....partes æq. M.

Then add as much pyroxylin as the solution will dissolve.

## CREASOTUM—CREASOTE.

*Formula.* $C_8H_{10}O_2$. Sp. gr. 1.071.

*Derivation.* Creasote is a product of the distillation of wood tar, its name being derived from the Greek χρεας, "flesh," and σωτης, "preserver," as animal substances, when saturated with it, are preserved from putrefaction. It is also obtained from crude pyroligneous acid.

Creasote, when fresh and pure, is a colorless, oleaginous fluid, with a strong, empyreumatic odor, resembling closely carbolic acid, and a caustic, burning taste. After exposure, it has a yellowish or brownish tinge. Its purity may be tested by strong acetic acid, which dissolves the creasote, and leaves behind the impurities floating above the creasote solution. It may also be tested by dropping it on paper, when, if pure, it will, after being volatilized by heat, leave no stain. Creasote may be distinguished from carbolic acid, which it closely

resembles in many respects, by not coagulating collodion when mixed with it, and by not imparting a blue color to a piece of pine wood dipped first into an alkaline solution of creasote, and then, after drying, into muriatic acid.

*Medical Properties and Action.* Creasote is stimulant, sedative, rubefacient, escharotic, styptic and antiseptic. It possesses the property of immediately coagulating albumen, and to this property is ascribed many of its effects on the living system. In large doses it is an acro-narcotic poison; but in small doses, it is styptic and astringent, and for the latter property it is more generally administered than for any other. When creasote comes in contact with the blood, the latter changes from a bright red to a reddish brown color, with small spots of coagulated albumen, and also becomes thicker. Applied to the tongue, it causes severe pain, but without redness or tumefaction; it also causes a strong taste of smoke, and a copious flow of saliva. When administered internally in small doses, it causes a sensation of warmth in the stomach, and exercises a decided sedative action. In large and poisonous doses, it produces profound stupor, flushed countenance, fixed eyes, slow and labored pulse, irritable stomach, nausea, vertigo, but has no effect, such as dilation or contraction, on the pupils. The treatment in cases of poisoning by creasote consists in administering albumen, such as white of eggs, milk, or wheat flour; also the administration of ammonia and other stimulants, mustard, emetics, etc. Death from creasote is caused by its coagulating the albumen of the blood, and preventing its circulation through the arterial system.

*Therapeutic Uses.* Creasote is administered internally for gastric irritability and vomiting, flatulence, diarrhœa, diabetes, hæmoptysis, pulmonary consumption, chronic bronchitis, epilepsy, neuralgia, etc. Externally, it is applied to ulcers, eruptions, diseases of the skin, wounds, hemorrhage from wounds or leech bites, warts; also in putrid sore throat, as a gargle.

*Dose.* Of Creasote, gtt. j or gtt. ij, several times a day, either in mucilage, in the proportion of half a fluid ounce to a drop of the creasote; or it may be given in pill form. For external

use, from gtt. ij to gtt. vj, or more, may be added to a fluid ounce of water.

CREASOTE WATER—*Aquæ Creasoti*—(creasote, ℥j, distilled water, Oj). Dose of creasote water, f℥j to f℥iv.

*Dental Uses.* Creasote, like carbolic acid, is a valuable agent in dental practice, although the use of the latter has, in some respects, superseded that of the former, the two being very similar in their action, with some advantages in the case of carbolic acid. Creasote is employed for the relief of odontalgia, obtunding the sensitiveness of dentine, alveolar abscess, dental periostitis, suppurating pulps of teeth, devitalizing pulps of teeth, treatment of exposed pulps of teeth, mercurial and other forms of stomatitis, ulcers of the mouth, diseases of the gums; as a styptic for hemorrhage from the gums, mucous membrane and leech bites, and after the extraction of teeth Creasote, like carbolic acid, has a peculiar power as an antiseptic, hence it is a valuable application in cases attended with offensive purulent discharges. It promotes the growth of healthy granulations, and hastens the healing of wounds, and arrests the process of suppuration. When applied to ulcerated surfaces, it should be repeated as pus is formed or fungous growths appear. It is a painful escharotic upon mucous membrane, with, however, a soothing reaction. An ointment—*Unguentum Creasoti*—is composed of creasote, f℥ss, lard, ℥j, and is useful in cutaneous affections.

For the treatment of exposed pulps it is employed either diluted or in its full strength; for dental periostitis and alveolar abscess, in its full strength, or in combination with such agents as glycerine, iodine, etc.; also in devitalized teeth, and as an antiseptic application in ulceration of the mouth, and recession of gums from the necks of the teeth. When used as a styptic after the extraction of teeth it is applied on lint or cotton, with pressure; and diluted with water, it is employed in the treatment of caries and necrosis of the maxillary bones. To dilute it for injections it is often mixed with alcohol, and the strength reduced by adding water. Mixed with an equal quantity of oil of cloves its odor and taste are modified. Creasote is also

employed to neutralize any acid remaining in the cavity of a tooth about to be filled, and to harden and render imperishable the contents of the dentinal tubuli, for which purpose it is applied to the walls of the cavity on a pellet of cotton.

### DENTAL FORMULÆ.

*For Alveolar Abscesses.*

℞. Creasoti,
Linimenti Iodi, partes æquales. M.
SIGNA.—To be used as an injection.

*For Odontalgia.*

℞. Creasoti..... ℥ss
Camphoræ.....gr. x. M.
SIGNA.—To be applied, on a pellet of cotton, to carious cavity.

*For Odontalgia.*

℞. Creasoti..... ʒ ij
Morphinæ Acetatis.....gr. xx. M.
SIGNA.—To be applied, on cotton, to carious cavity.

*For Odontalgia.*

℞. Creasoti,
Chloroformi,
Liquidi Opii.....āā..... ʒ iij
Tinctura Benzoini..... ℥ j. M.
SIGNA.—To be applied, on a pellet of cotton, to carious cavity.

*For Odontalgia.*

℞. Creasoti,
Chloroformi,
Morphinæ Hydrochloratis.....āā..... ʒ iij
Tincturæ Benzoini..... ℥ j. M.
SIGNA.—To be applied, on a pellet of cotton, to carious cavity. (See Formulæ of Carbolic Acid.)

## CRETA PRÆPARATA—PREPARED CHALK.

### PRECIPITATED CHALK, CARBONATE OF LIME.

*Formula.* $CaCO_2$.

*Derivation.* Prepared chalk is obtained by freeing chalk from such impurities as gritty and flinty substances and soluble saline matter, by elutriation, and afterwards drying it. It is the only form in which chalk is used medicinally.

*Medical Properties and Action.* Prepared chalk is antacid, absorbent and astringent. It diminishes the secretion of the mucous membrane, and at the same time acts as antacid in correcting any acidity present. When internally administered for a considerable time, like magnesia, it accumulates in the bowels and forms intestinal secretions; hence an occasional aperient is necessary.

*Therapeutic Uses.* Prepared chalk is an excellent antacid in diarrhœa from acidity, in acidity attending dyspepsia and

gout, chronic bronchitis in advanced stages, rachitis, etc. Externally, it is employed in the treatment of ulcers, burns, excoriations and skin diseases. It moderately stimulates ulcers and absorbs the discharge, thus preventing them from spreading.

It is an antidote for poisoning by oxalic and most of the vegetable and mineral acids.

*Dose.* Of Prepared Chalk, gr. v to ℈j, in powder or suspended in water by the aid of mucilage and sugar.

Chalk Mixture—*Mistura Cretæ*—(prepared chalk, ℥ss; acacia, gr. cxx; water, f℥iv,) is often combined with opiates and astringents, such as laudanum and tincture of kino, or of catechu, in the treatment of diarrhœa. Dose, ℥j to ℥ss.

*Dental Uses.* Prepared chalk is used in dental practice chiefly for its antacid property, and generally as an ingredient of dentifrices; it is also employed in the form of powder as an antacid in acidity of the oral fluids, for which purpose it is rubbed between the teeth and permitted to remain during the night; it is also employed to obtund the sensitiveness of dentine, on account of its absorbent and antacid properties; for such a purpose it should be applied repeatedly, for several days, to the sensitive surface. In the dental laboratory it is used as a polishing powder for metal and plastic work; also for polishing the surfaces of gold fillings. The precipitated chalk of the Pharmacopœia is the preparation to be preferred, on account of its freedom from gritty particles.

DENTAL FORMULÆ.

*Dentifrice.*

(Chapin A. Harris.)

℞. Cretæ Præparatæ.....℥iv
Pulv. Radicis Iridis.....℥iv
Pulv. Cinnamon.....℥iv
Sodii Carbonatis Exsicatæ.....℥ss
Pulv. Sacchari Albi.....℥j
Olei Limonis.....gtt. xv
Olei Rosæ.....gtt. ij.

Signa.—Ingredients to be thoroughly pulverized and well mixed.

*Dentifrice.*

℞. Pulv. Radicis Iridis.....℔ss
Cretæ Præparatæ.....℥iv
Sodii Carb.....℥ss
Pulv. Cinchonæ.....℥iv
Pulv. Sacchari Albi....℥ij
Pulv. Myrrhæ.....℥j
Pulv. Ossis Sepiæ.....℥ij
Otto Rosæ.....gtt. iv.
With Rose Pink, q. s. to color.

*Dentifrice.*

(Am. Dent. Association.)

℞. Cretæ Præparatæ..... ℔iij
Pulv. Cinchonæ..... ℔j
Pulv. Radicis Iridis..... ℔j
Pulv. Sacchari Albi..... ℔jss
Pulv. Saponis Cas..... ℥j
Sodii Carb..... ℥j
Olei Sassafras..... gtt. lxxx.

*Dentifrice.*

℞. Cretæ Præp..... ℥iij
Pulv. Radicis Iridis..... ℥ij
Pulv. Sacchari Albi..... ℥j
Pulv. Cinnamom..... ℥iij
Pulv. Saponis Cas..... ℥ij
Pulv. Myrrhæ..... ℥j
Ol. Gaultheriæ..... gtt. x. M.

*Dentifrice in the form of a Camphorated Paste.*

(Keller Medicine Co.)

PTS. BY WT.

℞. Magnes. Carb..... 2
Glycerini..... 1
Potas Chlorat..... 3
Tr. Camphora..... 1
Ol. Gaultheriæ..... q. s.
Cretæ Præp..... q. s.

To make desired number of parts.

Syr. Simplic..... q. s. M.

To make a thick paste.

*Dentifrice in the form of a Paste for Compressible Tubes.*

(Keller Medicine Co.)

PTS. BY WT.

℞. Magnes. Carbonat..... 2
Sodii Bicarb..... 3
Potas. Chlorat..... 5
Calcii Carbonat..... 20
Sapo. Cas. Pulv..... 6
Glycerini..... 1
Olei Gaultheriæ,
Olei Limonis.....āā.....q. s.
Syr. Simplic..... q. s.

Signa.—To make a paste.

*Dentifrice.*

(Am. Dent. Association.)

℞. Cretæ Præp..... ℔iij
Pulv. Cinchonæ..... ℔j
Pulv. Radicis Iridis..... ℔j
Pulv. Sacchari Albi..... ℔jss
Pulv. Saponis Cas..... ℥j
Sodii Carb..... ℥j
Glycerini ..... f℥iij
Mellis..... q. s. M.

and form into a paste.

*Dentifrice, Antacid, Tonic and Antiseptic.*

℞. Cretæ Præparatæ..... ℥iv
Quininæ Disulph..... gr. iv
Pulv. Ossis Sepiæ..... ℥iv
Otto Rosæ..... gtt. iv. M.

*Dentifrice in the form of Glycerine Tablets.*

(Keller Medicine Co.)

PTS. BY WT.

℞. Solut. Magnes. Carb..... 2
" Sodii Bicarb..... 1
" Potas. Chlorat..... 3
" Sapo. Cas. Albi..... 6
Glycerini..... 1
Cal. Carb..... 10
Ol. Gaultheria
Cassiæ.....āā..... q. s. M.

To flavor.

*Dentifrice.*

℞. Cretæ Præparatæ..... ℔iss
Pulv. Sodii Boratis,
Pulv. Radicis Iridis.āā.℔ss
Semen Cardamom..... ℥j
Pulv. Sacchari Albi..... ℔ss
Otto Rosæ..... q. s. M.

To flavor.

Dentifrices may be pleasantly flavored with wintergreen, cassia, sassafras, lemon, peppermint, anise, lavender, penny-royal, cloves, calamus, attar of roses, oil of neroli, etc.

# CROTON-CHLORAL HYDRATE.

## Butyl-Chloral Hydrate.

*Formula.* $C_4H_5Cl_3OH_2O$.

*Derivation.* Croton-chloral Hydrate is obtained by the action of chlorine upon aldehyde. It is in the form of small, brilliant, white, silvery crystals, of a sweetish taste, like that of melons. It is slightly soluble in water, and resembles hydrate of chloral in its hypnotic effects; but its action in this respect is not so powerful, nor so certain. It differs from hydrate of chloral in the singular property of causing anæsthesia of the head. To relieve pain and induce sleep, the best effects are obtained from a combination of the two agents.

*Medical Properties and Action.* It is sedative, hypnotic and anæsthetic. It resembles chloral hydrate, but is not so certain in its effects as a hypnotic. Its action commences in the head and face.

*Therapeutic Uses.* Croton-chloral hydrate is highly recommended in dysmenorrhœa, sciatica, chronic cough, and in neuralgia as an anodyne. One or two grains will relieve severe neuralgia of the fifth pair of nerves; it is frequently necessary, however, to administer from five to fifteen grains, but it is not safe to exceed this amount at one time.

*Dose.* Of Croton-chloral Hydrate, gr. j to gr. x; as an anæsthetic, gr. xv, dissolved in warm water.

*Dental Uses.* It is employed with effect in facial neuralgia, in doses of from two to five grains every hour or two, until fifteen grains have been taken; also, as a sedative, in doses of from three to five grains, in dental periostitis, pulpitis, etc., etc.

DENTAL FORMULA.

*For Neuralgic Odontalgia.*

Von Kirchbauer.

℞. Croton Chloral..... ʒj
Glycerini..... ʒvj
Aquæ Destill..... ʒiiss
Syr. Aurantii..... ʒiv
Oleum Fœniculæ..... gtt. vj. M.

Signa.—A tablespoonful, and, if pain continues severe, repeat the dose in an hour.

## CUPRI SULPHAS—SULPHATE OF COPPER.

### Blue Vitriol, Blue Stone.

*Formula.* $CuSO_4$, $5H_2O$.

*Derivation.* Sulphate of Copper is obtained by roasting the native sulphuret, or by the combination of oxide of copper and sulphuric acid, filtering and crystallizing. It is in the form of blue prismatic crystals which, after exposure to the air, effloresce to a slight degree, and become covered with a greenish-white powder. It has an astringent, metallic taste.

*Medical Properties and Action.* Sulphate of copper is emetic, tonic, nervine, stimulant, and astringent, and is quite soluble in water, but insoluble in alcohol. It is a prompt and efficient emetic, the emesis commencing in a few minutes after it reaches the stomach, and the copper comes up with the vomited matter. Little or no depression follows its administration as an emetic, and it is especially adapted to cases of narcotic poisoning.

*Therapeutic Uses.* Sulphate of copper is employed as a prompt and efficient emetic in cases of poisoning; it is also administered in intermittent fever, neuralgia, diarrhœa, dysentery, croup, epilepsy, hysteria, etc., etc. Externally it is applied in ulcerative and gangrenous affections, superficial hemorrhage, leucorrhœa, gonorrhœa, ringworm, purulent ophthalmia, mucous discharges, diseases of the skin, indolent ulcers, fungous granulations, warts, etc.

*Dose.* Of Sulphate of Copper as an emetic, gr. iij to gr. v; or dissolve 20 grains in two ounces of distilled water and give a tablespoonful every 15 minutes until vomiting occurs. For internal use other than emetic the dose is gr. ⅙ to gr. ss, in pill.

*Dental Uses.* Sulphate of copper is employed in dental practice, in the form of the ammoniacal solution, for long standing cases of neuralgia; and externally it is applied to ulcers of the mouth, cancrum oris, aphthous ulceration, ulceration of the gums and mucous membrane of the mouth, hemorrhage from leech bites, fungous growths of the gums, etc., etc.

DENTAL FORMULÆ.

*For Cancrum Oris, Aphthæ and Gangrenous Affections of the Mouth.*

℞. Cupri Sulph. (Powdered).....gr. v
Mellis.....℥ss M.

SIGNA.—Apply as a lotion, or by means of a camel's-hair brush.

*For Ulcerative Stomatitis.*

℞. Cupri Sulph.....gr. x
Pulv. Cinchona.....℥ij
Pulv. Gum Acaciæ.....℥j
Mellis.....℥ij
Aquæ .....℥iij. M.

SIGNA.—Apply, by means of a camel's-hair brush, to the ulcerated surface.

*For Gangrenous Ulcers of the Mouth and Cancrum Oris.*

R. Cupri Sulph.....℥ij
Pulv. Cinchonæ.....℥ss
Aquæ.....℥iv. M.

SIGNA.—Brush over ulcerated surface twice daily.

*For Caries of the Maxillary Bones.* (BARTHOLOW.)

℞. Cupri Sulph
Zinci Chloridi.....āā.....partes xv
Liquor Plumbi..... " xxx
Aceti Destillatæ..... " cc.

SIGNA.—To be applied for 30 minutes at a time.

## ETHIDENE DICHLORIDUM—DICHLORIDE OF ETHIDENE.

*Formula.* $C_2H_4Cl_2$. Sp. gr. 1.225.

*Derivation.* Dichloride of Ethidene is obtained in the preparation of chloral, from the waste products, and is very much like chloroform in appearance, odor and taste. It has a variable boiling point of about 115° F., and is readily soluble in alcohol, sparingly soluble in water, and but slightly soluble in chloroform. It is inflammable, but less so than alcohol.

*Medical Properties and Action.* Dichloride of ethidene is a general anæsthetic, and is said to occupy an intermediate rank between chloroform and ether. It reduces the action of the heart to a less degree than chloroform, with, however, considerable depression of the pulse.

It has been somewhat employed in England, where it is regarded as being safer than chloroform for inhalation, and requiring a less quantity to produce anæsthesia than ether.

*Methods of Administration.* It is recommended to admnter nitrous oxide until the patient is nearly unconscious, and then to add the vapor of ethidene. The effects of this agent are described as follows: The pupils dilate, and at the same time stertorous breathing commences; the pulse falls, and

should be carefully watched, and insensibility to pain continues for some time after the patient becomes conscious. It is also claimed for this agent that there are no unpleasant after-effects, the patient recovering as if from a natural sleep, with a clear mind and distinct utterance. It is also recommended to combine the vapor of ethidene with that of nitrous oxide, by loosely inserting a sponge containing half an ounce of ethidene in the nitrous oxide gas inhaling tube, or in the rubber supply bag, when the effect is said to be more profound and agreeable than when nitrous oxide alone is administered, with no nausea and but little lividity of lips. It is also said to produce relaxation of the muscles rather than rigidity, differing in this respect from nitrous oxide gas.

Dichloride of ethidene is also employed as a local anæsthetic, in the same manner as chloroform, aconite, etc., for the relief of facial neuralgia, etc.

It has not been introduced to any extent into this country.

## ETHYL BROMIDUM—BROMIDE OF ETHYL.

### Hydrobromic Ether.

*Formula.* $C_2H_5Br$. Sp. gr. 1.420.

*Derivation.* Bromide of Ethyl is obtained from bromide of potassium, sulphuric acid, alcohol and water, by distillation, and re-distilled by chloride of calcium. It is a colorless and very volatile liquid, boiling at 40° C., heavier than water, and possesses an agreeable ethereal odor and a pungent taste, strong and sweetish, with a somewhat burning after-taste. It is readily soluble in alcohol and ether, and but sparingly soluble in water.

*Medical Properties and Action.* Bromide of ethyl is considered to be a very effective and pleasant general anæsthetic, but like all other agents of this class, it must be administered with great care, and a pure article employed. There is no doubt but that it is pleasanter to inhale than chloroform, exceedingly rapid in producing complete unconsciousness, and very evanescent in its action. That it is any safer than some

other and older agents of this class, clinical experience has not demonstrated, as several deaths occurred in a very limited number of the administrations attending its introduction. Bromide of ethyl is not inflammable, nor caustic, nor even irritant, in this respect being preferable to chloroform, which is very caustic, and to sulphuric ether, of which the ingestion is nearly impossible. Dr. Isaac Ott, comparing bromide of ethyl with other anæsthetics, says: "(*a*) Chloroform increases the pulse, then slows it by a cardiac inhibitory stimulation; ether increases the pulse; nitrous oxide also increases it by paralysis of cardiac inhibitory apparatus; whilst bromide of ethyl increases the pulse by an action on the heart itself. (*b*) Chloroform reduces the blood pressure by paralysis of the main vasomoter centre, and cardiac debility; ether greatly increases it and keeps it increased; and nitrous oxide also increases it; bromide of ethyl increases it either by a stimulation of the spinal or peripheral vasomotor system. (*c*) Chloroform increases, and then decreases, respiration; nitrous oxide reduces it; bromide of ethyl decreases it by a central action." He also draws the following conclusions: "1. Bromide of ethyl, either by inhalation or subcutaneous use, kills, by a toxic action on the centres of respiration. 2. That the decrease of force and frequency of the heart contributes to the paralysis of the respiratory centres. 3. That injections of ethyl into the jugular, toward the heart, kill, by cardiac arrest, probably due to an action on the cardiac muscle. 4. Bromide of ethyl, in toxic doses, depresses momentarily the frequency of the heart, which is followed by a subsequent rise to normal rate. 5. Bromide of ethyl, in toxic doses, depresses the arterial tension, due, in major part, to the depressant action of the drug upon the heart, and in minor part, to a partial loss of tone of either the spinal vasomotor centres or the peripheral vasomotor system. 6. The inhibitory power of the pneumogastric is not paralyzed."

Introduced into the stomach, bromide of ethyl does not produce anæsthesia, as when absorbed by the respiratory organs, and does not increase the pulse over its normal beat; and in

the second stage, causes an intermission of the pulse every second beat.

*Administration.* Bromide of ethyl is best administered in a folded starched napkin, so as to cover the face, and having inside of it a soft linen handkerchief. On the linen handkerchief two measured drachms of the agent should be poured, and the patient directed to take long, deep inspirations, or what is better, to make prolonged and forced expirations. In two minutes from the time of administration of the first two drachms, a third drachm should be given, and this should be repeated at intervals of two minutes. Like all general anæsthetics, however, the quantity for inhalation differs according to the susceptibility of the patient. Two drachms of the bromide of ethyl will generally, in from one to three minutes, produce anæsthesia as profound as that produced by an ounce of sulphuric ether. As it produces an anæsthetic effect on the muscles of the throat and upper parts of the pharynx, it is useful for operations on the mouth and throat.

Its odor is more rapidly removed, and is more agreeable than that of sulphuric ether, and its effects more rapid than even those of chloroform, as it is eliminated by respiration, and by the kidneys, more speedily than any other general anæsthetic agent. It requires excessive quantities to affect the heart and respiration to any great degree. Having no caustic action, it can be safely applied subcutaneously, and also to the external auditory meatus and to the mucous membrane. It evaporates upon the skin very rapidly, producing a very sensible feeling of cold. As a rule, its general effects are as follows: Moderate acceleration of the pulse and respiration; slight excitement or talking, and seldom any struggling; flushing of face; dilatation, sometimes preceded by contraction of pupil; diaphoresis, generally profuse; complete anæsthesia in two or three minutes; recovery of consciousness in from one to two minutes after the withdrawal of the anæsthetic agent; no after-vomiting.

Any specimen of bromide of ethyl which has a disagreeable odor, or which, on standing, becomes brown, or any that will

explode and burn, is impure, and should not be employed for inhalation. A common impurity is *bromoform*, produced by the action of bromine and caustic potassa on alcohol, or wood spirit. Bromide of ethyl possesses properties intermediate between those of chloroform and ether. As a local anæsthetic, it is highly spoken of, and, owing to its non-inflammability, is the only anæsthetic which can be used in connection with the actual cautery. For use as a local anæsthetic, the bromide of ethyl is atomized with the "spray apparatus," which should furnish enough of the liquid to moisten the skin. The extremity of the tube should be held some two or three inches from the surface on which the spray is to be thrown. Within two or three minutes after its first application, anæsthesia of the part occurs, which is shown by the appearance of a white spot. The formation of this spot may be hastened by superficially puncturing or scratching the skin. The sensation of cold thus produced is sometimes disagreeable, but is rarely painful. The skin, and even a thin layer of the subjacent tissue, may be painlessly incised while the white spot lasts. This anæsthetic appears to be very well adapted for short operations, requiring simple anæsthesia and not complete muscular resolution, hence it is now preferred by some, for the extraction of teeth, to either chloroform or ether. Internally, bromide of ethyl has lately been recommended for whooping cough, in the form of a solution of 1 part of bromide of ethyl in 200 parts of water; also in angina pectoris, the dose being one-half to two ounces.

Given internally, it is also said to relieve gastric pain, without affecting the appetite. Inhalations readily relieve convulsive cough; and, introduced on cotton wool into the external meatus, it relieves the pain of otalgia, without causing any irritation.

## EUCALYPTUS—EUCALYPTUS.

*Source.* Eucalyptus is obtained from the eucalyptus globulus, a tree of large size, and of the natural order Myrtaceæ, found originally in Australia, and known as the "Blue Gum Tree." These trees are now growing in the southern parts of Europe

and the United States, and northern Africa, and their presence is thought to be preventive of malaria. The leaves, which are ensiform, of a grayish-green color, and parchment-like, are the only part which possesses medicinal qualities. They have a pleasant, aromatic odor, with a warm, bitter, and somewhat pungent taste, like that of cubebs, the fresh being more active than the dried leaves. Their medicinal virtue is owing to a volatile oil—*Oleum Eucalypti*—which contains three principles, called *eucalyptene*, *turpene*, and *cymol*. Tannic acid, and a peculiar crystalline fatty acid, are also found in eucalyptus; but eucalyptene is the most important constituent.

*Medical Properties and Action.* Eucalyptus is antiseptic, disinfectant, sedative, tonic, diaphoretic, and somewhat astringent. When taken into the mouth, it excites the flow of saliva, and leaves a hot, pungent, persistent and disagreeable odor. When introduced into the stomach, it causes a sensation of warmth, and promotes the secretion of the gastric juice. Being stomachic, it increases the appetite and the digestive action, with increased intestinal secretion. Large doses produce offensive eructations, a feeling of weight and tension at the epigastrium, and indigestion, followed by diarrhœa, and irritation and congestion of the kidneys. It increases the action of the heart, lessening the arterial tension, and causes a feverish condition. It accelerates the respiratory movements, and although it induces sleep in the weak and anæmic, it has the opposite effect upon the strong and healthy. The secretions of the skin, mucous membrane and kidneys are increased by it, and become strongly odorous, owing to the presence of eucalyptol, a name given to the oil. The inhalation of large quantities of the vapor produces effects analogous to those of the agent when taken in substance, and the essential oil is readily diffusible and readily impregnates the blood.

*Therapeutic Uses.* While the internal use of eucalyptus is contraindicated in inflammatory conditions, it is a very efficient remedy in atonic dyspepsia; chronic, gastric, and intestinal catarrh, cachectic conditions, flatulence, palpitation of the heart, hysteria, chorea, asthma, catarrhal broncho-pulmonary affec-

tions, chronic diseases of the liver and bladder, etc. It is also employed in intermittent fever, and during convalescence from remittent fever. Externally, it is an efficient application to chronic forms of angina and tonsillitis, to foul ulcers and wounds, etc.

*Dose.* Of the fluid extract of Eucalyptus, ʒss–ʒj; of the tincture of eucalyptus—*Tinctura Eucalypti*—fʒss to fʒij; of the extract—*Extractum Eucalypti*—gr. j to ℈j; of eucalyptol, the dose is ♏v to ʒss, in capsules or emulsion.

*Dental Uses.* In dental practice, the decoction of the leaves is an efficient local application in the different forms of stomatitis, after the acute stage has subsided. The tincture and the distilled water are used as disinfectant applications in indolent offensive ulcers of the mucous membrane of the mouth. The tincture of eucalyptus has been employed with advantage to obtund the sensibility of dentine. The oil of eucalyptus, either alone or combined with iodoform, forms one of the most effective antiseptics in use, for the treatment of putrescent pulps of teeth, alveolar abscess, of the chronic form, foul ulcers of the mouth, etc.

No other antiseptic preparation appears to prove more efficient as an antiseptic than the combination of eucalyptus oil and iodoform, in the treatment of suppurating conditions, necrosis, and caries of the bones of the jaws, etc. The oil can be introduced as an injection, with an abscess syringe, or by means of a fine broach, armed with cotton, taking care that the agent is carried to the seat of the disease, and the application repeated as often as is necessary. It is also employed as a local anæsthetic for odontalgia, and as an astringent or styptic in superficial hemorrhages, mucous discharges, ulcerating mucous membrane of the mouth, and for spongy, ulcerating gums.

DENTAL FORMULÆ.

*For Suppurating Pulps, Ulcers, etc.*

℞. Olei Eucalypti.....ʒj
Iodoformi.....gr. xv. M.

Signa.—Apply as an injection, by means of a syringe; or on cotton wrapped on the end of a fine broach; or on a strand of floss-silk.

*For Abscess of Antrum.*
GEO. L. PARMELE.

℞. Eucalypti..... ℥j
Iodoformi.....gr. x
Aquæ..... ℥j. M.

SIGNA.—To be used as an injection in connection with a tent of floss silk saturated with glycerine and eucalyptus.

*For Alveolar Pyorrhœa (Rigg's Disease).*
G. V. BLACK.

℞. Olei Eucalypti... .....♏xc
Acidi Carbolici.....♏xc
Olei Gaultheriæ.....♏xxx. M.

SIGNA.—Apply by means of an abscess syringe.

## FERRUM—IRON.

Chemical analysis demonstrates the presence of iron in the blood, the gastric juice, chyle, lymph, bile, milk, urine and the pigment of the eye; and, although metallic iron is inert, yet, when it reaches the stomach, it is dissolved by the acids, and thus acquires molecular activity. By its oxidation in the stomach hydrogen is set free, which in its nascent state unites with sulphur, forming sulphuretted hydrogen.

*Medical Properties and Action.* The salts of iron act through and upon the blood, improving its quality and increasing its quantity, and hence they are termed "hæmatinic." These salts of iron are absorbed into the system, and are detected in the blood, urine, etc., and under their use the appetite increases, the digestion is improved, the pulse increases in frequency and fullness, the health becomes better, and there is an increase in flesh and an improvement in color; hence they are "restoratives." As these salts of iron in large doses cause nausea and vomiting, being irritant poisons, and even small doses, when administered for a long period, exhaust the gastric glands by overstimulation, their use is contra-indicated in a plethoric condition, especially when accompanied with a hemorrhagic tendency, or when there is an atheromatous state of the cerebral vessels. Certain of these salts, such as the sulphates, the chlorides, and the nitrates, possess a high degree of astringency, and when taken internally produce constipation. Brought in contact with the blood, they coagulate it, and solidify the albuminous elements of the tissues, being powerful "hæmostatics."

Without great care is exercised in the internal administra-

tion of iron, owing to the acidity and astringent property of many of these preparations, injury results to the teeth, upon which they act with great energy. The tincture of the chloride and the sulphate, as shown by the experiments of Dr. Smith, of Edinburg, Scotland, are more corrosive than the wine of iron, and even more injurious than the compounds of iron with the vegetable acids. The use of an alkaline gargle of carbonate of soda, or prepared chalk, or solution of ammonia, before and after the taking of the iron preparation into the mouth, and the subsequent employment of an antacid dentifrice, will obviate the injurious effects of these salts of iron upon the teeth. The preparation known as dialysed iron—*Ferrum Dialysatum*—which is iron in the colloid state, made by the process of diffusion, is odorless, without the styptic taste of the other preparations, and does not discolor the teeth, being free from irritant action; neither does it cause constipation, and hence is the best form in which to administer iron. The dose of dialysed iron is ♏v to ℥j.

*Therapeutic Uses of Iron.* Iron is an efficient tonic, and promotes the appetite and the digestion; hence it is employed in anæmia, chlorosis, combined with quinine, in chronic malarial affections; syphilitic cachexia, acute rheumatism, erysipelas, diphtheria, scrofula, rickets, neuralgia depending on anæmia, epilepsy in weak, anæmic subjects, fatty degeneration of the heart, passive forms of hemorrhage due to anæmia, albuminuria, etc., etc. Externally the styptic preparations of iron are employed to arrest hemorrhage—hemorrhage from leech bites, hemorrhage following the extraction of teeth, hemorrhage resulting from wounds and surgical operations, etc., etc.

[For doses of the various preparations of iron, see "Table of Doses."]

Chloride of Iron—*Ferri Chloridum*—Perchloride of Iron. *Formula.* $Fe_2Cl_6,12H_2O$. Is obtained by heating iron wire with hydrochloric acid, and afterwards converting the ferrous chloride thus formed into ferric chloride by heating it with hydrochloric and nitric acids. It is in the form of crystalline masses of an orange yellow color, inodorous and of a strong

styptic taste. It is deliquescent and readily soluble in water, alcohol and ether. It is used internally in the form of tincture —*Tinctura Ferri Chloridi. Dose*, ♏v to ♏xx.

Externally the chloride of iron is employed as a styptic and for an astringent, for the latter purpose being in solution of various strength.

*Dental Uses.* In dental practice the chloride of iron is used internally for the treatment of neuralgia when it is attended with anæmia; also externally, for the arrest of alveolar hemorrhage, although the preference is given to the solution or powder of the subsulphate. The chloride of iron may be used in the semi-deliquesced or crystallized form, or in solution—*Liquor Ferri Perchloridi*—which is preferred by some to the crystallized. To bleeding surfaces it is applied in the proportion of ℥ss to ℥vj to the ounce of water. One part of the chloride gradually added to six parts of collodion, in the form of a yellowish-red, limpid liquid, makes a valuable styptic. Chloride of iron is also useful as an application to fungous tumors.

Solution of Subsulphate of Iron—*Liquor Ferri Subsulphatis*—Monsel's Solution—is composed of sulphate of iron, ℥xij; sulphuric acid, ℥j and gr. xxx; nitric acid, gr. ccclx. It is of a syrupy consistence and a ruby red or dark brown color, no odor or acrid taste, but possesses powerful astringent properties.

Powdered Subsulphate of Iron—*Pulvis Ferri Subsulphatis* —Monsel's Powder—is in the form of a yellow powder, and possesses the same astringent and other properties as the solution, and is applied as a styptic in alveolar hemorrhage with much greater convenience.

*Medical Properties and Action.* Monsel's solution and powder act topically as powerful astringents and mild caustics, and are considered to be among the best styptics in use. These styptics combine with albumen and form a pale yellow compound, and on this property depends their chemical action on the tissues of the body. Internally administered they act like the sulphate of iron, their remote effect being tonic and hæmostatic. In small doses they exert an astringent effect on the

gastro-intestinal mucous membrane, diminishing the quantity of fluids secreted or exhaled; hence their constant use will cause constipation.

Monsel's preparations of iron are principally used externally for hemorrhage from bleeding vessels. When employed internally it is for the arrest of hemorrhage from remote organs.

*Therapeutic Uses.* The solution and powder of the subsulphate of iron are used internally for hemorrhage from the stomach and bowels. Externally, for hemorrhage, varicose ulcers, etc., etc.

*Dose.* Of the solution of subsulphate of iron, gtt. v to gtt. x, twice a day, in some bitter infusion. Of the powdered subsulphate of iron the dose is gr. v to gr. xv. The solution is also given in small doses with the sulphate of magnesia, as an artificial chalybeate purging water.

*Dental Uses.* In dental practice Monsel's solution and powder are principally employed for arresting hemorrhage following the extraction of teeth, hemorrhage from leech bites, and also from other causes, such as wounds of the gums and mucous membrane, in the treatment of ulcers of the mouth; and the solution, diluted with water, forms a serviceable application for abraded and inflamed mucous surfaces.

For Hemorrhage Following the Extraction of Teeth. —After carefully cleansing the bleeding cavity as thoroughly as possible, the styptic should be applied on a pellet of cotton, or, in case the powdered subsulphate of iron is employed, on a pellet of cotton previously dipped in sandarach varnish, to which the powder will adhere, and inserted over the mouth of the bleeding vessel at the apex of the alveolar cavity. Cotton should then be inserted over the styptic preparation, and the alveolar cavity be thoroughly filled up. If necessary, a compress, made from a cork, should be applied over the cotton filling the cavity, and held in place by the opposing teeth when the mouth is closed.

DENTAL FORMULA.

*For Hemorrhage from Extraction of Teeth.*

STEERE.

℞. Liq. Ferri Persulph,
Sodium Chlor..āā..partes æquales. M.

SIGNA.—Apply on cotton to bleeding cavity and secure by covering with a roll of cotton cloth.

## GELSEMIUM—YELLOW JASMINE.

*Source.* Gelsemium is obtained from the root of the *gelsemium sempervirens*—yellow jasmine—woodbine, belonging to the natural order Apocynaceæ, which grows plentifully in the southern United States. The root is of a brownish color externally, and a grayish color within, and is sold in small pieces, from one-half to two inches in length, and a quarter of an inch in thickness, being hard and slightly cracked longitudinally. It has a bitter taste and an aromatic odor, somewhat like that of green tea.

*Medical Properties and Action.* Gelsemium has a depressing and sedative influence upon the nervous centres, and diminishes the force and frequency of the heart's action. It contains a very powerful alkaloid, *gelsemia* or *gelsemina*, which is colorless, odorless, with an intensely bitter taste.

Gelsemium, in moderate doses, causes a languid feeling, attended with mental calmness, slow action of the heart, drooping eyelids, dilatation of the pupil, and some feebleness of muscular movements. In larger doses it causes vertigo, double vision, amblyopia, paralysis of the muscle that elevates the upper eyelid, so that it cannot be raised, dilated pupil, labored respiration, on account of its effect upon the respiratory muscles, slow and feeble movement of the heart, great muscular weakness, and a reduced sensibility to pain and touch. Such effects occur about half an hour after the gelsemium is taken, and continue for two or three hours, when they disappear.

When poisonous doses are taken, all of the symptoms described above occur in a more intense degree, and there is first

an unsteady gait, until all muscular power is lost, the lower jaw drops, the muscles of the tongue are paralyzed, speech being impossible, the respirations are very labored, slight and irregular, and the action of the heart weak, feeble and intermittent, and generally the skin is covered with a profuse perspiration. Death occurs from asphyxia, but consciousness is preserved until near the end, which is generally calm, and not disturbed by convulsions.

*Therapeutic Uses.* Gelsemium is internally administered in tetanus, mania, convulsive or spasmodic cough, such as whooping cough; pneumonia, remittent and typho-malarial fevers, ovarian and other forms of neuralgia, cerebro-spinal meningitis, pleuritis, etc., etc.

*Dose.* Of the fluid extract of gelsemium—*Extractum Gelsemii Fluidum*—the only officinal preparation, ♏v to ♏xv. Of the tincture of gelsemium—*Tinctura Gelsemii*—(gelsemium, ℥iv, alcohol, Oj), the dose is gtt. x to gtt. xx. The fluid extract is preferable for administration, but one fluidrachm of this has caused death. Dose of the alkaloid *gelsemia*, gr. $\frac{1}{60}$ to gr. $\frac{1}{20}$.

*Dental Uses.* Gelsemium is greatly extolled as a remedy for neuralgia of the fifth nerve, often affording permanent relief, especially when the affection is associated with diseased teeth. The dose may be repeated at any time after an hour and a half, if the pain is not relieved; a third dose is seldom required. In neuralgia of the face or head, three-minim doses of the tincture of gelsemium every half hour, will often act very beneficially, and leave no ill effects. Owing to the toxic effects of this drug, care is necessary that the dose is a moderate one, and the symptoms carefully observed.

## GLYCERINUM—GLYCERIN.

*Formula.* $C_3H_5$ 3HO. Sp. gr. 1.25.

*Source.* Glycerin is obtained from the saponification of fats and fixed oils, and contains a small percentage of water. It is a colorless, inodorous, syrupy liquid, of a sweet taste, and freely soluble in water and alcohol, but not in ether or chloroform.

*Medical Properties and Action.* Glycerin is nutrient and emollient, possessing considerable power as a solvent and preservative. The addition of ¼, ⅛, or even $\frac{1}{16}$ part of glycerine to a lotion, or a poultice, or an external application, renders it particularly emollient and soothing. It keeps the parts moistened and soft and corrects or prevents the disagreeable odor of discharges, and it does not evaporate or dry at any ordinary temperature. Glycerin dissolves carbolic acid, creasote, tannic acid, borax, iodine, quinine, iodide of potassium, gallic acid, etc., and its uses as a solvent and vehicle for other remedies are very numerous. It has been prescribed as a substitute for cod-liver oil where the latter nauseates. Officinal solutions of medical agents in glycerin are known as glycerites (*glycerita.*)

*Therapeutic Uses.* Glycerin is rarely used alone as an internal remedy, its chief use being external, or in combination with other medicinal substances. It has been prescribed in phthisis, diabetes, acne; externally, as an emollient in acute coryza, chronic follicular pharyngitis, chapped hands and face, fissures, skin diseases, dressing for wounds and ulcerated surfaces, and as a vehicle for the application of astringents to the eye; also to soften cerumen and for the removal of insects from the ear, and to diminish the secretion of pus; also in burns, abraded surfaces, erysipelas, etc. It has also been employed in smallpox as an emollient and to prevent pitting, a mixture of one part of glycerin and two parts of rose water being applied after the pustules have broken and the discharge has commenced to dry. It is applied for a few days, until the scabs begin to loosen. Glycerin is also used in croup, locally applied to the glottis; also in deafness, where the auditory canal is dry and inelastic. For an emollient application it is frequently combined with other agents, and used in the form of an ointment or an embrocation. Five parts of glycerin rubbed up in a mortar with four parts of yolk of egg, forms a compound which prevents the action of the air from irritating broken or abraded surfaces, and is soothing in erysipelas, cutaneous affections, etc. Although glycerin is so bland in

its general character, yet it produces a smarting sensation when first applied to an abraded surface of the skin; such an effect is thought to be due to the affinity of glycerin for moisture, which it abstracts from the skin so rapidly as to cause the smarting sensation; mixing the glycerin with a little water will obviate this. Pure glycerin when mixed with water will raise the temperature eight or ten degrees, and hence the two should be combined previous to its application.

*Dose.* Of Glycerin ℥j to ℥ij.

*Dental Uses.* Glycerin is a useful agent in dental practice as a solvent and emollient, as a solvent alone, and as both solvent and emollient, when combined with other substances.

It is employed with great benefit in such affections as diseases of the mucous membrane of the mouth, such as the different forms of stomatitis, for ulcers of the mouth, aphthæ, alveolar abscess, abraded surfaces from the irritation of acrid substances, artificial teeth, etc.

In the treatment of inflamed and ulcerated conditions of the mucous membrane, it is frequently combined with borax, and for chronic alveolar abscess, or after the use of more active agents, and diseases of mucous membrane, it is combined with carbolic acid, iodine, sulphite of soda, etc. As an anodyne and emollient application, glycerin is combined with morphine, atropine, acetate of lead, etc., etc. To form ointments and embrocations, it is combined with gum tragacanth, lime water, oil of almonds, rose water, etc., etc.

### DENTAL FORMULÆ.

*For Chronic Abscess, Ulcerations, etc.*

℞. Glycerini..... ℥j
Tinct. Iodi. Comp..... ♏xlv
Acidi Carbolici Cryst... ♏vj
Aquæ Destillatæ..... ℥v. M.

SIGNA.—Apply as a lotion or injection.

*For Aphthous Ulceration of the Mouth.*

℞. Glycerini..... ℥j
Sodii Sulphitis..... ʒj. M.

SIGNA.—Apply as a lotion.

*For Inflammation and Ulceration of the Mucous Membrane.*

℞. Glycerini..... ℥j
Sodii Boratis..... ʒij. M.

SIGNA.—Apply as a lotion.

*For Chronic Alveolar Abscess, Ulcerations of Mucous Membrane, etc.*

℞. Glycerini..... partem 1
Acidi Tannici..... partes 2.

*For a Sedative Application in Inflamed Mucous Membrane.*

℞. Glycerini
Chloroformi .....āā.....ʒ ss. M.

SIGNA.—Apply as a lotion.

*For Pulpitis.*

℞. Glycerini.....gtt. ij
Acid Carbolic.....gr. v
Tr. Aconit. rad.
Aq. Menth. pip....āā...gtt. ij
Acid. Tannic.....gr. j
Ol. Menth. pip.
Ol. Caryophilli....āā....gtt.xxv. M.

SIGNA.—Apply on cotton.

*For Pulp Canals of Abscessed Teeth.*

FAUGHT.

℞. Glycerini.....fʒ ij
Acidi Tannici.....ʒ ij
Morphiæ Acetatis.....ʒ j
Iodoformi .....℈ j. M.

SIGNA.—Apply on floss silk or cotton.

*For Aphthous Sore Mouth of Infants.*

R. Glycerini
Aquæ.....āā..... ʒ ss
Sodium Sulph.....gr.xxx. M.

SIGNA.—Use on swab every 2 hours.

## HAMAMELIS—HAMAMELIS.

### WITCH HAZEL.

*Source.* Hamamelis Virginica is an indigenous shrub, common to all parts of the United States and Canada, and usually found in stony places and on the banks of streams. The bark and leaves are the medicinal portions.

*Medical Properties and Action.* It is tonic, astringent, sedative, and anodyne. The bark has a bitter, astringent, and somewhat sweetish and pungent taste, and was first employed by the Indians as a sedative and discutient application, in painful tumors and other cases of superficial inflammation. The bark contains from eight to ten per cent. of tannic acid, and also a bitter principle.

*Therapeutic Uses.* Hamamelis Virginica, although not until recently officinal, has for some time been employed in hemorrhage of the lungs, hæmatemesis, and in phthisis. Externally, it is applied to tumors, inflamed and painful parts, etc., etc., in the form of a fluid extract, decoction and tincture. Two minims of the tincture of hamamelis every half hour, will often control hemorrhages from nose, uterus and from hemorrhoids.

*Dose.* Of fluid extract of Hamamelis, ℥ss to ℥ij; of the decoction, ℥ss to ℥j.

*Dental Uses.* Hamamelis is employed in dental practice as

a sedative or anodyne application, in incipient dental periostitis, in the form of the fluid extract, applied *warm* on lint or cotton, as a lotion; also as an anodyne, to irritated and painful exposed pulps of teeth; also for passive hemorrhage from the mucous membrane of the mouth; also for the soreness arising from the removal and effects of salivary calculus. The tincture may be applied as a sedative lotion, in the proportion of one part to ten of water.

## HYDRARGYRUM—MERCURY.

### Quicksilver.

*Formula.* Hg. Sp. gr. 13.5.

*Sources.* Mercury is a metal of a nearly silver-white color and a very high degree of lustre. It is liquid at all ordinary temperatures, and only solidifies when cooled to 40°. It fuses at 39° F., and readily volatilizes at 662° F.; it boils and yields a transparent, colorless vapor, of great density. It also volatilizes somewhat at ordinary temperatures, and especially above 68° F. The ordinary ore from which metallic mercury is obtained is the *mercuric sulphide*, although it is occasionally met with in globules disseminated through this native sulphide, and which is noted as *cinnabar*. There is also a form known as *horn silver* or native calomel, and a native amalgam of silver and mercury. California furnishes metallic mercury of a peculiar purity, in large quantities. The metal is obtained from the sulphide by the process of "roasting." When pure, metallic mercury does not readily tarnish in the air, and it can be purified by re-distillation, or by adding to it a small quantity of a strong solution of nitrate of mercury.

The impurities are generally dirt, dust, lead, tin, bismuth or zinc.

*Dental Uses.* Metallic mercury is employed in dental practice as an ingredient of amalgam filling material, being combined for such a purpose with silver, tin and zinc, and sometimes with gold and platinum, in addition to the other metals named.

Hydrargyri Chloridum Corrosivum—*Corrosive Chloride*

*of Mercury—Corrosive Sublimate. Mercuric Chloride. Formula.* $HgCl_2$.

*Derivation.* Corrosive sublimate is obtained by subliming a mixture of chloride of sodium and mercuric sulphate, the latter made by boiling together sulphuric acid and mercury; double decomposition takes place, forming mercuric chloride and sulphate of sodium. Corrosive sublimate is in the form of colorless crystals, or crystalline masses, which are inodorous, fusible, and sublime without residue, and of an acrid, styptic taste. It is readily soluble in 15 parts of water, 7 parts of alcohol and ether.

*Medical Properties and Action.* (See Hydrargyri Chloridum Mite.)

*Therapeutic Uses.* Corrosive sublimate is alterative in small doses, and in large quantities is a powerful irritant poison, corroding the stomach and causing death in a very few hours. Its continued use has caused salivation, but it has a less tendency to produce such an effect than the other preparations of mercury. Internally it is employed in secondary syphilis, chronic diarrhœa and dysentery. Externally in diseases of the eye, diseases of the skin, ulcers, gonorrhœa and gleet, etc., etc. The external application to large surfaces is dangerous. Its use is contra-indicated in patients affected with pulmonary disease.

For cases of poisoning the antidotes are albumen, white of egg, wheat flour, milk, etc.

*Dose.* Of Corrosive Sublimate gr. $\frac{1}{30}$ to gr. $\frac{1}{10}$, in pill or solution.

*Dental Uses.* It is employed as a lotion, injection or gargle in chronic diseases of the mucous membrane, ulcers, etc.

Hydrargyri Chloridum Mite—*Mild Chloride of Mercury. Calomel. Mercurous Chloride. Formula.* HgCl.

*Derivation.* Calomel is obtained by subliming a mixture of mercurous sulphate and chloride of sodium, a double decomposition taking place, by which mercurous chloride and sulphate of sodium are formed. The mercurous sulphate thus employed is obtained by boiling mercury in sulphuric acid and triturating the resulting mercuric sulphate with mercury.

To remove any corrosive sublimate which the calomel may contain it is washed with hot distilled water until the absence of a white precipitate with ammonia shows that the poisonous ingredient has been removed. Calomel is in the form of a white, inodorous, tasteless powder, insoluble in water, alcohol, and ether, and wholly volatilized by heat. Calomel is incompatible with the alkalies, and alkaline earths and alkaline carbonates, with lead, copper and iron. When nitro-muriatic acid is combined with it, corrosive sublimate is formed; neither should it be given in combination with iodine.

*Medical Properties and Action.* Calomel and the other mercurials are employed as alteratives, sialagogues, purgatives, diuretics, etc., and moderate doses increase the action of the secreting glands and organs, stimulating the salivary glands in a very decided manner. When large doses are administered the effects are manifested on the gums, which become tender and swollen, the salivary glands take on increased action, the saliva and buccal mucus flow profusely, the mucous membrane of the mouth becomes inflamed and ulcerated, the tongue swollen and the breath fetid, with a metallic, coppery taste, and the teeth become loose, such symptoms constituting the condition known as salivation. When the use of the drug is discontinued these symptoms disappear, but the mucous membrane and gums are ever after more susceptible to irritation, and the stability of the teeth is more or less impaired, as is shown by the recession of the gums and the absorption of the alveolar processes. In many cases the gums, especially about the necks of the teeth, remain somewhat tumefied, with a tendency to ulceration.

If the use of the mercury is continued beyond the stage which the symptoms just described indicate, or even as the effects of small doses in persons very susceptible to the influence of mercury, an excessive salivation ensues, with serious ulceration of the gums and mucous membrane of the mouth, loss of the teeth, and even necrosis of the bones of the jaws. Mercury has also the effect of causing considerable emaciation, from the absorption of fat, and sometimes a peculiar

febrile state known as mercurial fever; and also diarrhœa, skin diseases, rheumatism, neuralgia and disorder of nervous system. Mercury, after it is absorbed, has a decided effect upon the blood, which it impoverishes, destroying the red blood globules (hematine and globuline); the blood contains more water, is more prone to putrefaction, and the unnatural fluidity predisposes to hemorrhage, which may become dangerous.

*Therapeutic Uses.* Mercury in the form of calomel, blue mass (*Pilulæ Hydrargyri*—pills of mercury—mercury ℥ij; confection of rose, ℥iij, and powdered liquorice root, ℥j,) are employed as sialagogues, indirect tonics and cholagogues, and purgatives in syphilis, diseases of the skin, bilious derangements, dyspepsia, acute glandular affections, diarrhœa and dysentery of infants, hepatic disorders, croup and membranous laryngitis, cholera, etc., etc.

*Dose.* Of calomel, gr. $\frac{1}{10}$ to gr. x; of blue pills, or mass, gr. ss. to gr. xv. Mercurials are administered by the mouth, by inunction, by fumigation, and by the hypodermic method.

Mercurial Ointment—*Unguentum Hydrargyri.* Blue ointment is made by rubbing two parts of mercury with one part of suet and lard each, until the globules disappear. When rubbed into the skin, it produces the constitutional effects of mercury, and is applied to tumors, syphilitic sores, blistered surfaces, and is used to destroy pediculi, and also to prevent suppuration and pitting in smallpox.

Mercury with Chalk—*Hydrargyrum cum Creta*, gray powder, consists of mercury, three parts, prepared chalk, five parts. It is a gentle laxative, when given in full doses, and is antacid, and employed chiefly as an alterative in infantile diarrhœa, etc.

*Dose.* Of Mercury with Chalk, for adults, gr. v to xx; for children, gr. ss to ij, iij or x.

The effect of mercurial preparations upon children is sometimes very serious, as a profuse, or even gentle salivation will, at times, cause mortification and destruction of the bones of the jaw, the teeth, the cheek, and lip; and although such cases may not be common, yet, to avoid such a powerful action, the

gums should be frequently and carefully examined, when a course of such remedies is being pursued.

DENTAL FORMULÆ.

*For Febrile Excitement of Dentition.*

℞. Calomel.....gr. ij ad iij
Magnes. Calc.....gr. xxiv
Ipecacuanhæ Pulv.....gr. ij to iij.
F. ch. No. xij.

SIGNA.—One to be given every three hours.

*For Diarrhœa of Dentition.*

℞. Calomel.....gr. ij ad vj
Cretæ Ppt .....gr. xviij
Ipecacuanhæ Pulv.....gr. ij
Extract. Hyoscyami.....gr. iij ad vj.
F. chart. No. vj.

SIGNA.—One every two or three hours, according to circumstances.

*For Diarrhœa of Teething Children.*

℞. Hydrargyri cum Creta
Pulv. Ipecac. et Opii..āā..gr. j. M.

SIGNA.—One powder.

*For Venereal Sore Mouth and Throat.*

℞. Hydrar. Chlor. Corros.gr. j
Mellis Despumati.....f ℥ ss
Aquæ Destillatæ.....f ℥ iv. M.

SIGNA.—To be used as a gargle.

*For Warts, Condylomata, etc.*

℞. Hydrar. Chlor. Corros. ℥ j
Collodii..... ℥ j. Solve.

SIGNA.—To be applied as a caustic with a camel's-hair brush.

## IODOFORMUM—IODOFORM.

TERIODIDE OF FORMYL.

*Formula.* $CHI_3$.

*Derivation.* Iodoform is a preparation of iodine, being obtained by the action of chlorinated lime upon an alcoholic solution of iodide of potassium, heated to 104° F., the product being iodoform and iodate of lime, the iodoform being separated by boiling alcohol. It is in the form of small, pearly crystals, of a yellow color, with an unpleasant odor, like that of saffron, and a sweetish taste, and soft to the touch. It is volatile, and soluble in alcohol, chloroform, ether, and the fixed and volatile oils, but insoluble in water.

*Medical Properties and Action.* Iodoform has no irritant action, and, in small doses, is tonic, stimulant, anodyne, alterative and disinfectant, having great influence on the nervous system; it is also antiseptic. In large doses, it causes a form of intoxication, followed by convulsions and fatal effects. In the form of vapor, it possesses anæsthetic properties, but not

equal to those of the general anæsthetics in common use. It has also been used as a local anæsthetic, and also as an antiseptic. Its odor can be detected in the blood, the brain, and the muscles.

*Therapeutic Uses.* Iodoform produces the constitutional effects of iodine, but it is chiefly used externally for painful cancerous and phagedenic ulcerations, irritable ulcers, ill-conditioned wounds, obstinate skin diseases, scrofulous glandular enlargements, to allay the pain of gout and neuralgia, and for phthisis, mixed with starch and spread on paper, so that the vapor may be inhaled. Dusted over a diseased surface, it allays pain and changes the morbid action. A saturated solution of iodoform in chloroform is recommended for neuralgia; also a saturated solution in any of the essential oils is used for the same affection. In the form of an ointment, it is used as an application to irritable ulcers. For ulcerated surfaces, it may be sprinkled over the part, and lint, coated with glycerine, applied as a dressing.

*Dose.* Of Iodoform, gr. j to gr. iij, three times a day, in the form of pill.

*Dental Uses.* Iodoform is highly recommended in dental practice, as an antiseptic, either alone, or what is better, combined with eucalyptus oil. It possesses no escharotic property sufficient to cause irritation or the destruction of parts. In the treatment of alveolar abscess, iodoform, in combination with oil of eucalyptus, has given great satisfaction; also in cases of putrescent pulps, applied as an injection. It is recommended to be used as follows: First, an injection of eucalyptus oil, followed by the introduction of the mixture of iodoform and eucalyptus into the root canal, on cotton, or on a strand of floss silk, which is charged by first dipping it into the oil, and then in the iodoform; or the two may be combined in a solution (see Eucalyptus), and, in this form, introduced into the sac or root canal. Dr. C. N. Peirce recommends iodoform ground up with equal parts of oil of cloves and oil of eucalyptus, which forms a substance of a soft, cheesy consistence, a portion of which can be introduced to inflamed part, on the

point of a small broach. A saturated solution in eucalyptus oil is also serviceable as an external application in neuralgia. Iodoform is also employed as an anodyne, for the relief of the pain following the extraction of teeth affected with periostitis and alveolar abscess; also as an injection in diseases of the antrum. When iodoform is used alone, a pellet of cotton or a strand of floss silk may be dipped in glycerine, and the iodoform be thus taken up. To disguise the unpleasant odor of iodoform, it may be incorporated with a little essence of rose, as half a drop of the essence will remove the odor of sixty grammes of iodoform; the odor is also disguised by balsam of Peru and oil of cinnamon. Three grains of cumurin (a derivative of the Tonka bean), will disguise the odor of one drachm of iodoform; or the addition of attar of rose, one minim to the drachm; or of essence of rose geranium, three or four minims to the drachm. According to some, it is not a matter of indifference whether iodoform be applied as a dressing for wounds and ulcers, in the form of crystals, as amorphous powder dissolved in ether, or as an ointment. Iodoform acts not only as a chemical combination, allowing the escape of iodine in a free state, but it has certain mechanical properties. When the surface of an ulcer or wound is covered with a layer of iodoform in crystals, a certain degree of absorption of the fluids secreted takes place. These products of secretion penetrating the interstices between the minute crystals of iodoform soon lose the liquid form, and produce with them an impermeable crust. Under this crust, cicatrization soon occurs, without any retraction of the tissues; hence they suppose that the best form in which to employ iodoform for ulcers and wounds is that of the crystals. As toxic effects have followed the internal administration of iodoform, it should be prescribed with care, and also the application of it to extensive surfaces be avoided. The toxic symptoms have been manifested as follows, the maximum dose which caused them having been 12½ grains:—

"Giddiness, vomiting, and deep sleep, from which the patient could be roused with difficulty. The somnolence was inter-

rupted by periods of excitement, each lasting several hours, and was followed by delirium, intense headache, sense of impending death, spasmodic contractions of the facial muscles, and in the case of the younger patient, diplopia. The functions of the other sensory organs were not disturbed, and the pupils presented a normal reaction. Deep inspirations alternated with apnœa of about a minute's duration. After five or six days, the toxic symptoms gradually lessened and passed away."

Iodoform has been used for odontalgia, on account of its gently caustic and anodyne action on exposed pulps of teeth. Combined with arsenious acid and creasote in a devitalizing mixture, iodoform is supposed to lessen the pain caused by the arsenical paste.

## DENTAL FORMULÆ.

*For an Ointment of Iodoform and Eucalyptus.*

℞. Pulv. Iodoformi.....ʒ ss
Olei Eucalypti.....f ʒ ss
Vaselin.....ʒ iv. M.

SIGNA.—To be used as an ointment.

*For Neuralgia and Tumors of the Gums.*

℞. Iodoformi.....gr. xv
Bals. Peru.....gr. xxx
Glycerini vel Vaselin.....q. s. M.

To make a solution or ointment.

SIGNA.—To be applied as a solution; or, if the vaseline is used, as an ointment.

*For Odontalgia.*
(SCHAFF.)

℞. Pulv. Iodoformi.....gr. lx
Kaolin.....gr. lx
Acidi Carbolici.....gr. viij
Glycerini.....q. s.
Olei Menthæ Piperit....gtt. x. M.

Triturate the iodoform, kaolin, and oil of peppermint, with enough glycerine to form a thick paste.

SIGNA.—Apply to exposed surface of pulp.

*New Methods for Deodorizing Iodoform.*

1.—Carbolic Acid..... 1 part
Iodoform..... 2 parts.

Powder and mix well.

No change appears to take place in the iodoform, but the odor is marked by that of carbolic acid.

2.—Iodoform.....100 parts
Oil of Peppermint..... 5 parts
Oil of Neroli..... 1 part
Oil of Lemon..... 2 parts
Tinct. Benzoin..... 2 parts
Acetic Acid..... 1 part.

Powder the iodoform, and mix thoroughly with the other ingredients. Transfer to a well stoppered flask, and keep at a temperature of from 120° F. to 140° F., over a water-bath for two days. The mixture has a pleasant odor of Eau de Cologne.

3.—Camphor..... 5 parts
Charcoal..... 10 parts
Iodoform..... 15 parts.

Powder and mix intimately.

*For Pulpitis, as a Capping.*

PASCHKIS.

℞. Iodoform. pulv.
Kaolin, pulv.....āā.....gr. lx
Acid. Carbolic (Cryst)..gr. viij

Mix, and add sufficient glycerin to form a paste, then add:—

Ol. Menth. pip.....gtt. x.

SIGNA.—Apply on point of broach over inflamed portion.

*For Tumors, Enlarged Glands, etc.*

℞. Iodoformi.....part. i
Collodii.....part. x. M.

SIGNA.—To be applied as a lotion.

*For Devitalizing Pulps of Teeth.*

℞. Iodoformi.....gr. v
Acidi Arsenios.....gr. x
Creasoti.....q. s. M.

To make a paste.

SIGNA.—Apply on cotton, or on point of a broach.

*For Pulpless Teeth.*

℞. Iodoformi.....gr. x
Acidi Tannici.....gr. iij
Glycerini.....gtt. xv. M.

SIGNA.—Apply on floss silk, or by syringe.

PREPARATION.—Rub iodoform to fine powder in a mortar, and add the tannin, and after mixing thoroughly, add the glycerin. One drop of oil of cinnamon will disguise the odor.

*For Pulpless Teeth with a Fistulous Opening.*

FAUGHT.

℞. Iodoformi.....ℨ j
Acidi Tannici.....ʒ ij
Glycerini.....f ʒ ij
Morphiæ Acetat.....ʒ j M.

SIGNA.—Apply on floss silk.

## IODUM—IODINE.

*Formula*, I.

*Derivation.* Iodine is a non-metallic, metalloid element, obtained principally from kelp (made by burning seaweed and in the form of impure soda), which is subjected to distillation in iron retorts, after which it is mixed with sulphuric acid and black oxide of manganese. It is evolved in the form of vapor, which is condensed. The vapor is readily recognized by its beautiful violet color. Iodine is usually in the form of bluish-black crystalline scales, with a metallic lustre, and a strong, peculiar odor and a hot, acrid taste. It is slightly soluble in water and soluble in alcohol, ether, solution of chloride of sodium, and a solution of iodide of potassium.

*Medical Properties and Action.* Iodine in small doses is alterative, stimulant and tonic, and acts locally as an irritant, causing redness, itching and desquamation; exhaled in the form of vapor it excites cough and warmth in the air passages. Taken internally it excites a sensation of heat or burning in the stomach, and in large doses is an irritant poison, inflaming

the mucous membrane of the stomach and causing superficial eschars. The internal use of the iodides gives rise to an eruption of acne, especially on the face, thighs, and shoulders; they have also anaphrodisiac powers when long continued. The influence of the iodides in producing iodism may be prevented by large draughts of water being used during their administration.

The odor of iodine can be detected in the blood, brain, and muscles.

When combined with potassium its local irritant effect is diminished; hence the preparation known as IODIDE OF POTASSIUM, *Potassii Iodidum* (obtained by treating an aqueous solution of potassa with iodine), is employed whenever the constitutional effects of iodine are desired, as the iodide of potassium possesses many advantages over iodine for internal use, such as being less irritant, and for this reason may be administered in larger doses and for a greater length of time; it is also more soluble than iodine alone, and when taken into the stomach is absorbed much more rapidly. The formula is KI, and it is in the form of white crystals, of an acrid, saline taste. Some persons are peculiarly susceptible to the influence of iodine, even small doses causing unpleasant effects, such as headache, vertigo, derangement of the digestive organs, etc.

Iodide of potassium, like iodine, produces a very decided effect on the secretions, increasing them, and occasionally to the degree of ptyalism. The antidote for poisoning by iodine is starch.

*Therapeutic Uses.* Iodine and its preparations are valuable resolvents in the treatment of glandular enlargements, indurations, tumors, thickening of membranes, etc., etc.; also in scrofula, scrofulous ophthalmia, tubercular meningitis, advanced stage of pleurisy, chronic affections of the liver, etc., etc.

Iodide of potassium is much employed in mercurial poisoning and in syphilis, especially in the secondary and tertiary forms, and after the employment of mercury has proved useless; also in affections of the nervous system of a syphilitic origin, together with the other affections already referred to as

indicating iodine. Externally iodine is used in the form of tincture in the treatment of enlarged scrofulous glands, cutaneous affections, erysipelas, rheumatism, gout, phlegmons, syphilitic gummatæ and nodes, phagedænic ulcerations, carbuncles, diseases of the joints, wounds, and parts poisoned; and as a counter-irritant in pneumonia, phthisis, and pleurisy; and as injections in hydrocele, and bronchocele. The vapor is inhaled with benefit in chronic bronchitis and phthisis. Iodine also ranks highly as a disinfectant.

*Dose.* Of iodine alone, gr. ¼ to gr. j two or three times a day, in the form of a pill, directly after eating, on account of its irritant effect; the best form for administration, however, is Iodide of Potassium. Dose of the iodide of potassium, gr. iij to gr. x.

Tincture of Iodine—*Tinctura Iodi* (iodine, ℥j ; alcohol, Oj). Dose ♏j to ♏v.

Compound Tincture of Iodine—*Tinctura Iodi Composita* (iodine, ℥ss ; iodide of potassium, ℥j ; alcohol, Oj). Dose, ♏ij to ♏x.

*Dental Uses.* In dental practice iodine and its preparations are valuable agents, the officinal and compound tinctures being employed in the treatment of dental periostitis, alveolar abscess, mercurial stomatitis, and other forms of stomatitis, inflammation and ulceration of the gums, fungous growths of gum and tooth pulp, necrosed teeth and suppurating pulps of teeth, diseases of the antrum, caries of maxillary bones, dentigerous cysts, recession of gums and absorption of alveolar processes.

For the different forms of stomatitis, and especially mercurial stomatitis, the tincture of iodine is used in the form of a gargle; for an injection in alveolar abscess it is diluted or combined with carbolic acid, glycerine and other agents; for fungous growths it may be used alone, or combined with rectified alcohol; for ulcerations of gum and mucous membrane it is generally combined with carbolic acid; for dental periostitis it is combined with the tincture of aconite root, and is regarded as being almost a specific for the incipient stages of this affection. Either the officinal or compound tincture is employed

with an equal quantity of the tincture of aconite, the preparation being applied to the gum over root of affected tooth, which should be previously dried of moisture, by means of a camels'-hair brush or cotton on the point of an excavator. The mouth should be kept open and the part protected until a metallic pellicle is formed.

A valuable combination of iodine, carbolic acid, glycerin and water is known as "Boulton's Preparation," and is a useful application in the form of injections, gargles and lotions. For the chronic form of alveolar abscess, and also for the acute form, after more powerful agents have been employed, it is a useful remedy, possessing antiseptic and stimulant properties in a marked degree; it also possesses the property of modifying mucous membrane and diminishing sensibility; hence it is useful in ulcerations, etc. Tincture of iodine combined with creasote or carbolic acid is a powerful application in dental periostitis, suppuration of necrosed teeth, ulceration of margins of the gums, and for fungous growths, as it stimulates debilitated parts and destroys such as are too weak to be restored. A colorless tincture of iodine is composed of glycerin and aqua ammonia in combination with the iodine, but the presence of the ammonia restricts its use. Another colorless tincture, in which sulphate of soda is substituted for the ammonia, is less irritating in its effects.

The addition of water and honey to the officinal tincture of iodine will render it suitable for a gargle for inflamed and ulcerated parts. The iodide of potassium is employed internally in mercurial stomatitis, dental exostosis, facial neuralgia, convulsions of dentition, dental periostitis, looseness of the teeth, tumefaction and sponginess of the gums, syphilitic and scrofulous ulcerations of the mouth, caries and necrosis of the maxillary bones.

## DENTAL FORMULÆ.

*For Fungous Growths and Suppurating Surfaces.*

℞. Tinct. Iodi..... ℥ij
Spiriti Rectificati.. ..... ℥j. M.

SIGNA.—To be applied with a camel's hair brush.

*For Ulcerated Gums and Mucous Membrane.*

℞. Tinct. Iodi.....partem j
Mellis..... .....partes ij
Aquæ .....partes vij. M.

SIGNA.—To be used as a gargle.

*For Chronic Alveolar Abscess, Ulcerations, Inflammations, etc., etc.*
(BOULTON.)

℞. Tinct. Iodi. Comp.....♏xlv
Acidi Carbolici (Cryst)....♏vj
Glycerinæ.....℥j
Aquæ Destillatæ.....℥v. M.

It becomes colorless in from 8 to 10 hours.

SIGNA.—To be used as an injection, gargle or lotion.

*For Mercurial Stomatitis.*

℞. Tinct. Iodi.....ʒiij vel vj
Potassii Iodidi...gr. xv vel xxx
Aquæ.....Oss. M.

SIGNA.—To be used as a gargle.

*For Ulceration of Gums.*

℞. Tinct. Iodi.....♏xlv
Acidi Carbolici.....♏vj
Glycerinæ.....℥j
Aquæ Destillatæ.....℥v. M.

SIGNA.—Apply as a lotion.

*For Dental Periostitis.*

℞. Tinct. Iodi.....℥j
Creasoti vel
Acidi Carbolici.....ʒss. M.

SIGNA.—To be applied to gum about neck of tooth, as a counter-irritant.

*For Dental Periostitis.*

℞. Tinct. Iodi.....ʒx
Potassii Iodidi.....℥ss
Camphoræ.....ʒij
Spiriti Rectificati.....f℥x. M.

SIGNA.—Apply with a camel's hair brush to gum over root of affected tooth.

*For Dental Periostitis.*

℞. Tinct. Iodi.....
Tinct. Aconiti.....āā.....℥ss. M.

SIGNA.—To be applied by means of a camel's hair brush until a metallic pellicle is formed, three times daily.

*For Excessive Sweating of the Hands.*

℞. Tinct. Iodi.....ʒj
Lin. Camphoræ Comp.
Glycerinæ.....āā.....ʒiss
Lin. Belladonna Comp.℥j
Eau de Cologne.....ʒj. M.

SIGNA.—Apply as an embrocation twice a day, having previously well bathed the hands in warm water, in which is dissolved two drachms or half an ounce of chloride of ammonia and four drachms of carbonate of soda, crystals, enough water being used to well cover the hands.

## IRIDIS RHIZOME—ORRIS RHIZOME—ORRIS ROOT.

*Source.* The plant from which orris root is obtained is a native of Italy and the south of Europe. It belongs to the natural order Iridaceæ, of which there are three varieties of the species of Iris—*Iris Rhizoma*, *Iris Florentina* and *Iris Germanica.* The root, which is the officinal portion of the plant, is of various forms and sizes, often branched, usually knotty and flattened, white, heavy, and of the thickness of the finger. It has a pleasant odor, like that of violet, and a bitter, acrid taste.

*Medical Properties and Action.* Orris root is cathartic and

diuretic, and in large doses emetic. It has been employed with some benefit in dropsies, but is not often administered as a general remedy at the present time. It is valued for its pleasant, violet odor.

*Dental Uses.* In dental practice it is employed as a very common ingredient of dentifrices, and also to correct an offensive breath.

## ISONANDRA GUTTA—GUTTA PERCHA.

*Source.* Gutta Percha is the inspissated juice of the tree *Isonandra Gutta*, extensive forests of which are found in the East Indies. It belongs to the natural order *Sapotaceæ*. It is in the form of tough, flexible pieces, which have been freed from impurities by cutting it into thin slices, and then washing and tearing it into shreds by heavy machinery while it is softened in boiling water. It may be more thoroughly purified by dissolving it in either chloroform, benzol or hot turpentine, thus causing the impurities to separate, when it is evaporated to dryness. Crude gutta percha is of a chocolate or red dish-brown color; commercial gutta percha is of a grayish-white color, and the variety which has been purified by dissolving it in chloroform, etc., is almost white, greasy to the touch, and of a leathery smell, like that of india rubber. It is insoluble in water at any temperature, and is a bad conductor of heat and electricity. At ordinary temperatures it is tough, hard and inelastic, but towards 120° F. it softens, and at 150° it becomes soft and plastic, and may be moulded into any form, which it will retain on cooling, having, however, a perceptible shrinkage. Gutta percha is dissolved cold by chloroform and sulphide of carbon; benzol requires the aid of heat and oil of turpentine requires to be quite hot. The alkalies have no action upon it; but concentrated nitric acid attacks it rapidly, with effervescence and the escape of nitrous fumes.

*Dental Uses.* Combined with mineral substances it forms a plastic material for temporary fillings of teeth, and, colored with vermillion, is used for taking impressions of the mouth and for the base plates of plastic work. It is often employed

as a filling material, on account of its non-conducting property, protecting a partially-exposed pulp or sensitive dentinal surface from irritation when metallic fillings would not be tolerated.

The preparation known as "Hill's Stopping," is composed of gutta percha, quick-lime and feldspar, the mineral ingredients being incorporated with the gutta percha while the latter is in a plastic condition from the effects of heat. Gutta percha has been used for interdental splints.

*Solution of Gutta Percha—Liquor Gutta Percha*, is composed of gutta percha, ℥iss; chloroform, ℥xvij; or a thick solution may be made by dissolving as much gutta percha in chloroform as will give the desired consistence (like that of thick cream).

Solution of gutta percha is a useful application for the relief of odontalgia arising from an exposed and inflamed pulp; also for capping an exposed pulp, a more durable material being inserted over it. The chloroform of the solution quickly evaporates, leaving an impermeable covering of the gutta percha, which is non-irritable, non-conducting and protective. It is also a useful application for inflamed or abraded surfaces, chaps, skin affections, etc.

## KRAMERIA—KRAMERIA.

### Rhatany.

*Source.* Krameria is obtained from the root of the shrub krameria triandra, of the natural order *Polygaleæ*, native of Peru. It is in the form of cylindrical pieces, of the thickness of a quill, with many branches of a light red color within and crossed by a reddish-brown bark. The root is without odor, and of an astringent, and somewhat bitter sweetish taste.

*Medical Properties and Action.* Krameria is a powerful astringent, its medicinal property being due to tannic acid, of which it contains about forty per cent. There is also present an odorous principle, wax gum, and a peculiar acid known as *krameric acid.* When chewed it imparts a red tinge to the saliva. It imparts its properties very readily to alcohol, but less so to both cold and boiling water.

*Therapeutic Uses.* Krameria is employed internally for its astringent and a slightly tonic effect in the treatment of diarrhœa, dysentery, passive hemorrhages, menorrhagia, leucorrhœa, etc. Externally, in the form of powder, tincture and infusion, in the treatment of ozæna, ophthalmia, etc., and as an enema in hemorrhoids, fissures of the anus, sore nipples, leucorrhœa, etc., etc.

*Dose.* Of powdered krameria, gr. xx to gr. xxx; of the extract—*extractum krameriæ*, the dose is gr. v to gr. x; of the infusion—*infusum krameriæ* (krameriæ, ℥j; water, Oj); the dose is ℥ss to ℥j; of the tincture—*tinctura krameriæ* (krameriæ, ℥vj; diluted alcohol, Oij), the dose is ℥j to ℥ij. Of the fluid extract—*extractum krameriæ fluidum*, the dose is ♏v to ℥ss; of the syrup—*syrupus krameriæ*, the dose is ℥j to ℥iv.

*Dental Uses.* Krameria is a valuable astringent in dental practice, being employed in the form of the tincture in ulcerated and spongy gums; in the form of the infusion as a gargle in inflammation of the gums and mucous membrane; in the form of the powder and also tincture, in spongy and bleeding gums, as an astringent; and also in the form of the powder as an ingredient of dentifrices, for its astringent property.

DENTAL FORMULA.

*For Inflamed Gums and Mucous Membrane.*

(THOMAS.)

℞. Pulv. Krameriæ.
Pulv. Cinnamomi...āā..ʒj
Aquæ Bullientis.....fʒvij.
Macerate for two hours, strain, and add
sacchari ʒij. M.
SIGNA. To be used as a gargle.

## LIQUOR SODÆ CHLORATÆ—SOLUTION OF CHLORINATED SODA.

LABARRAQUE'S SOLUTION.

*Formula.* NaCl, NaClO.

*Derivation.* Solution of Chlorinated Soda is obtained by decomposing a solution of carbonate of sodium by one of chlorinated lime. It is a transparent liquid, of a greenish-

yellow color, having a faint odor of chlorine and a sharp saline taste.

*Medical Properties and Action.* Solution of chlorinated soda internally is stimulant, tonic and antiseptic. Externally, it is a stimulant, astringent and deodorizer, and is generally applied in the form of a lotion.

*Therapeutic Uses.* Solution of chlorinated soda is employed internally in typhus and typhoid and malignant scarlet fevers, mesenteric affections of children, etc. Externally it is used as an application to all forms of foul and indolent ulcers, ulcerations of membranes, ozæna, coryza, otorrhœa, syphilitic eruptions of scalp and other skin diseases, burns, etc., etc. It is used diluted, and has an alkaline reaction. It is a powerful disinfectant, and is useful in all affections attended with fetor. The concentrated solution is an irritant poison and caustic; largely diluted it is tonic and stimulant.

*Dose.* Of solution of chlorinated soda, gtt. xxx to ℥j, diluted, several times a day; it fulfills the same indications as chlorinated lime.

*Dental Uses.* Solution of chlorinated soda is a valuable agent in dental practice as a disinfectant, deodorizer and antiseptic. It is employed in mercurial stomatitis, ulcerated gums, fetid discharges from carious teeth, and all affections of the mouth attended with fetid discharge, and is useful for its stimulating property, thus inducing healthy action; also in aphthæ, cancrum oris, diseases of the antrum, necrosis of the bones of the jaws, scurvy, offensive breath, and as a bleaching agent for discolored teeth. It should be kept in glass-stoppered bottles and protected from the light and heat.

DENTAL FORMULÆ.

*For Aphthæ and Ulceration of the Mouths of Children.*

℞. Liquor Soda Chlor.,
Myrrhæ.....āā.....f ℥ ss
Aquæ Rosæ.....f ℥ j
Aquæ.....f ℥ vj. M.
SIGNA.—To be used as a lotion.

*For Mercurial Stomatitis, Fetid Discharges from Carious Teeth, Ulcerated Gums, etc.*

℞. Liquor Sodæ Chlor....f ℥ vj
Aquæ.....f ℥ xij M.
SIGNA.—To be used as a lotion.

*For Offensive Breath and Deodorizer Generally.*

℞. Liquor Sodæ Chlor. (concent).....gtt. vj to x
Aquæ Puræ.....℥ ij. M.
SIGNA.—To be used as a gargle.

*For Offensive Breath.*

℞. Liquor Sodæ Chlor.....℥ j
Aquæ.....℥ iv. M.
SIGNA.—To be used as a gargle.

*For Mercurial Stomatitis.*

℞. Liquor Sodæ Chlor....℥ ss
Mellis.....℥ ss
Aquæ Destillatæ.....℥ x. M.
SIGNA.—To be used as a mouth wash.

*For Phagedenic and Sloughing Ulcers.*

℞. Liquor Sodæ Chlor....f℥ j
Aquæ.....f℥ viij. M.
SIGNA.—To be applied as a lotion.

## LITMUS—LACMUS.

*Source.* Litmus is a peculiar coloring matter obtained from various species of rocella, of the natural order *Lichenes*—the Lichen order, which grow on Alpine or maritime rocks in various parts of the world. The varieties used for chemical purposes are obtained from the European and African coasts and northern Europe. They yield coloring substances by the reaction of water, air, and ammonia. Litmus is prepared chiefly in Holland; the lichens being coarsely powdered and macerated for several weeks, with occasional agitation in a mixture of urine, lime and potassa or soda, fermentation ensuing; the mass becomes first red and ultimately blue, and is then mixed with calcareous or siliceous matter, to give it consistence. A tincture is formed from this product (litmus 1 part to distilled water 20 parts), and blue litmus paper is made by steeping unsized paper in the liquid and afterwards drying it. The blue tincture is rendered deeper in color by indigo. Red litmus paper is prepared in the same manner, except that the tincture, into which the unsized paper is steeped, is reddened by the addition of sulphuric acid.

*Use.* The chief use of litmus in medicine and dentistry is as a test of acids and alkalies; *blue* litmus paper being turned *red* by acids, while *red* litmus paper is turned blue by alkalies. In dental practice litmus paper is employed to determine the nature of the oral fluids—whether acid or alkaline.

A single color, viz., purple, has recently been substituted for the ordinary blue and red litmus paper. This purple

litmus paper turns red with acids, blue with alkalies. It is claimed to be much more delicate and convenient.

## MAGNESIA—CALCINED MAGNESIA.

*Formula*, MgO.

*Derivation.* Magnesia is obtained by exposing carbonate of magnesium to a red heat, and thus expelling all of the carbonic acid, which is shown by a want of effervescence on the addition of dilute sulphuric acid. It is very light, and of white color and odorless, and in the form of powder, with an earthy taste, and slightly soluble in water, more so in cold than in hot water.

*Medical Properties and Action.* Magnesia is antacid and laxative, its laxative effect being the result of the combination it forms with the free acids of the stomach and intestines. After its effects are exerted in the intestinal canal, it becomes absorbed, and renders the urine alkaline. Large doses, when administered for a considerable time, may accumulate in the bowels; such an effect may be obviated by administering it with lemonade, which renders it more soluble. Being mild and unirritating, it is well adapted for children, and is an excellent remedy for great acidity in the stomach. It is the antidote in poisoning by the mineral acids.

*Therapeutic Uses.* Magnesia is administered in acidity of the stomach, heartburn, sick headache and kidney affections, as an antacid, and in combination with other agents in the diarrhœa of children. It is also an efficient aperient, alone or in a little milk.

*Dose.* Of Magnesia, as a laxative, gr. x to ʒj; as an antacid, ℈j. Of a preparation known as "Henry's," the dose is half the quantity just given.

*Dental Uses.* Magnesia is employed in dental practice, chiefly for its antacid properties, as an ingredient of dentifrices; in solution in the form of a gargle, to counteract the effects of acid medicines upon the teeth; also as an ingredient of remedies for infantile diarrhœa during the period of dentition; and also to change an acid condition of the oral fluids,

by being rubbed between the teeth and permitted to remain for a short time.

DENTAL FORMULÆ.

*For Infantile Bilious Diarrhœa.*

CONDIE.

℞. Magnesiæ Calc.....gr. xxiv
Calomel.....gr. ij–iij
Ipecacuanha.....gr. ij–iij
Ext. Hyoscyami.....gr.iv–vj.M.
F. ch. No. xij.

SIGNA.—One to be given every two or three hours.

*For Infantile Mucous Diarrhœa.*

EHERLE.

℞. Magnesiæ Calc..... gr. x
Bals. Copaibæ..... ʒj
Spir. Æther Nit..... ʒiij
Sacch. Alb..... ʒij
Aq. Cinnamon..... ℥iij. M.

SIGNA.—A teaspoonful every two or three hours; each dose to be followed in the course of an hour by the fifth of a grain of Dover's powder.

## MAGNESII SULPHAS—SULPHATE OF MAGNESIUM.

(EPSOM SALT.)

*Formula*, $MgSO_4\ 7H_2O$.

*Derivation.* Epsom salt is obtained by the action of sulphuric acid on *magnesite*, the silicious hydrate of magnesium. It is in the form of small colorless crystals, which effloresce on exposure to the air, and are very soluble in water. It is odorless, but has a very bitter taste.

*Medical Properties and Action.* Sulphate of magnesia is a refrigerant purgative, safe and mild in its action, and is perhaps more commonly employed as a cathartic than any other. It is at times combined with other agents.

*Therapeutic Uses.* Sulphate of magnesia is administered as a saline purgative in acute inflammatory and febrile affections, to depress the arterial tension, and also to relieve the kidneys where they are hyperæmic, hence it is a valuable remedy in renal and cardiac dropsy, constipation of lead colic, acute dysentery, dyspepsia with constipation, etc., etc.

*Dose.* Of Sulphate of Magnesia ʒj to ℥j, in water or carbonic acid water.

*Dental Uses.* Sulphate of magnesia is employed in dental practice, to reduce the arterial tension in acute inflammations of the dental organs, such as acute pulpitis, acute periostitis, etc.

To disguise the bitter taste of Epsom salts the following formula may be employed :—

℞. Magnesii Sulphatis..... ℥ v
Essentiæ Menthæ.....gtt. iij. M.

DENTAL FORMULA.

*For Dysuria of Difficult Dentition.*

℞. Sulph. Magnes..... ℥ ij to ℥ iij
Aquæ Puræ..... ℨ j *dein adde*
Spir. Æther. Nitrici.. ℥ ij
Tinct. Opii.....♏ vij to xv. M.

SIGNA.—A teaspoonful, to be repeated according to circumstances.

## MATICO—MATICO.

*Source.* Matico—*maticæ foliæ*, are the dried leaves of the shrub artanthe elongata, of the natural order *Piperaceæ*—pepper order, and is a native of Peru. They are from two to eight inches long by an inch in breadth, strongly reticulated, and of a bright green on the upper surface and lighter in color beneath when fresh, with an agreeable aromatic odor and a strong astringent taste. They contain a trace of tannic acid, a peculiar acid *artanthic*, a volatile oil, resin, and a very bitter principle—*maticin*.

*Medical Properties and Action.* Matico is an aromatic tonic, an alterative stimulant and internal hæmostatic and local styptic. It has a special determination to the mucous membranes, and although as an internal remedy its astringent properties are not so well marked, it acts externally as a reliable hæmostatic and styptic. The powder made from the under side of the leaf is more powerfully styptic than that from the upper side.

*Therapeutic Uses.* Matico in the form of powder, infusion and fluid extract, is employed in internal hemorrhages, epistaxis, atonic diarrhœa and diseases of the urinary passages, etc.; externally as a hæmostatic in superficial hemorrhages., and also in leucorrhœa, in the form of an injection.

*Dose.* Of powdered Matico, ʒss to ʒj, three times a day ;

of the infusion the dose is f℥ij ; of the fluid extract the dose is f℥ss to f℥j.

*Dental Uses.* The powder and tincture are valuable styptics in hemorrhage following the extraction of teeth, hemorrhage from leech bites and superficial wounds of mucous membrane.

## MENTHOL—JAPANESE CAMPHOR.

(Peppermint Camphor).

*Formula*, $C_{10}H_{20}O$.

*Derivation.* Menthol is the stearoptene of peppermint oil, and is obtained from this oil either by long keeping or by being cooled at a low temperature. Chemically, menthol occupies the position of an alcohol, having in its composition four atoms more of hydrogen than the ordinary camphor and containing the radical menthyl. It is in the form of a crystalline solid, composed of small white crystals of a peppermint odor and resembling sulphate of magnesia. It is imported as Japanese camphor, its chief source being the Japanese and Chinese peppermint oils. In a liquid state it has a specific gravity less than that of water. It is rendered liquid and volatile at a temperature one or two degrees below that of the body. It is sparingly soluble in cold water, liquefying slowly in water at 82° F., quickly at 120° F., but remains mostly as a separate body. It is freely soluble in alcohol, ether, glycerine, and in the fixed and volatile oils.

*Medical Properties and Action.* Menthol is anodyne, antispasmodic, and antiseptic. In doses of gr. $\frac{1}{10}$ to $\frac{1}{6}$ it steadies the contractions of an excited heart, and causes tranquillity, and at the same time slight cerebral drowsiness.

Half a grain may cause vomiting, from gastric irritation; hence care should be observed in its administration, either internally or externally, about the mouth. Its internal use is not advocated, unless well diluted, but its principal use is as an external application.

*Therapeutic Uses.* Menthol is said to prove as effectual as aconite, veratria and atropine, for such diseases as neuralgia

brachialgia and gout; more so, it is claimed by some. It is also applied to putrefactive wounds, as an antiseptic.

*Dental Uses.* In dental practice menthol has given satisfaction as an external remedy in facial neuralgia, odontalgia, as an obtunder of sensitive dentine, and as a local anæsthetic. For relieving the pain of sensitive dentine a small portion of the crystals is applied to the sensitive surface, and in a few minutes the local anæsthetic effect is produced. As an antiseptic it has been employed in the treatment of decomposing pulps of teeth, necrosed teeth, etc.

DENTAL FORMULA.

*For Facial Neuralgia and Odontalgia.*

℞. Menthol.....gr. j
Spts. Vini Rectificati.....♏j
Olei Caryophilli.....♏x. M.

SIGNA.—For facial neuralgia, painted on the affected part. For odontalgia, applied on cotton to carious cavity.

## METHYLIC ETHER—METHYL-ETHYLIC ETHER.

*Formula.* $(CH_2)_2O$.

*Derivation.* Methylic Ether is obtained by digesting methylic alcohol with strong sulphuric acid. It is a gaseous substance, of an ethereal odor, and under the name of *methyl-ethylic ether*, it has been used as a general anæsthetic. The methylic ether is prepared for use as methyl-ethylic ether by frequent washings in a strong solution of potassa, and is afterwards dissolved in absolute ethylic ether. In order that it may be fit for use, it is necessary to keep it for some time securely stopped.

*Dental Uses.* According to Dr. B. W. Richardson, of England, it is a superior anæsthetic for dental operations—better, he says, than nitrous oxide gas, because it allows air to be given with it, and does not asphyxiate nor produce muscular spasms and syncope. Under its influence the patient is in a state of semi-consciousness, but is not conscious of pain from an operation.

## MORPHINA—MORPHINE.

*Formula.* $C_{17}H_{19}NO_3$, $H_2O$.

*Derivation.* Morphine is the alkaloid which constitutes the chief narcotic principle of opium, the proportion varying from 10 to 15 per cent. It is present in opium in combination with meconic acid, and the meconate of morphia is separated by repeated macerations with water, after which the salt is decomposed by alcohol and water of ammonia, the latter precipitating the morphine and the former taking up the coloring matter as soon as it is freed from the alkali. The crystals of morphine are then boiled in alcohol and the solution filtered through animal charcoal. Morphine is in the form of white or colorless crystals, which are inflammable and freely soluble in boiling alcohol, scarcely soluble in cold water, and somewhat so in boiling water; the salts of morphine, however, are freely soluble in water. It is without odor, and has a very bitter taste. Morphine differs somewhat in its mode of action from opium, which may arise from the peculiar state of combination in which it exists in opium. Morphine is more insoluble than its salts, and for this reason the latter are preferred for administration.

*Medical Properties and Action.* Morphine is more powerful than opium; but it causes less vascular and arterial excitement, less headache and vertigo, less subsequent depression, less constipation, and often it will be retained on an irritable stomach when opium or its tincture (laudanum) would be rejected.

Morphine is indicated when the object is to relieve nervous irritability and induce tranquillity. The effects of morphine differ according to the peculiarities of nervous constitution. The hypnotic effect may be produced and the stimulant action be confined to the heart; in some cases the excitant effect prevails, or the two effects may be equal. The excitant effect may counteract the hypnotic effect to a greater or less degree, resulting in insomnia, with restlessness, or even delirium. Females appear to be more liable to its excitant effects than

males ; and if there is present a highly emotional, excitable and energetic temperament, it causes great distress, and dangerous effects when hypodermically administered.

*Therapeutic Uses.* Morphine, in the form of salts, is employed as an anodyne and hypnotic in neuralgic affections, diseases of the heart, painful uterine affections, and in all cases of painful affections. (See Opium.)

The principal salts of morphine are the acetate, the hydrochlorate and the sulphate.

### Morphinæ Acetas—Acetate of Morphine.

*Formula.* $C_{17}H_{19}NO_3$, $HC_2H_3O_2$.

*Derivation.* Acetate of morphine is obtained by precipitating morphine from the hydrochlorate of morphine, by the aid of ammonia, the precipitate resulting being washed in distilled water and dissolved and neutralized by acetic acid, after which it is evaporated and dried by heat. It is in the form of a white or yellowish-white amorphous or crystalline powder, altogether soluble in water and alcohol, and of a bitter taste.

### Morphinæ Hydrochloras or Murias—Hydrochlorate or Muriate of Morphia.

*Formula*, $C_{17}H_{19}NO_2$, HCl $3H_2O$.

*Derivation.* Hydrochlorate or Muriate of Morphine is obtained by macerating opium in distilled water, evaporating to a small quantity, and adding chloride of lime, and concentrating the solution until it becomes solid when cool, after which it is pressed, washed with distilled water, again evaporated, cooled and pressed, and again dissolved in distilled water, when it is subjected to animal charcoal, to remove the coloring matter, filtered, and precipitated by ammonia the codeia of the opium remaining in solution. The crystals resulting are then dissolved in muriatic acid, and the morphine allowed to crystallize into Hydrochlorate or Muriate of Morphine. It is in the form of snow-white, feathery, flexible and acicular crystals, of a bitter taste, and silky lustre and altogether soluble in water and alcohol.

### Morphinæ Sulphas—Sulphate of Morphine.

*Formula*, $C_{17}H_{19}NO_3$, $2H_2SO_4$, $5HO_2O$.

*Derivation.* Sulphate of morphine is obtained by dissolving morphine in boiling alcohol, and saturating it while hot with sulphuric acid, the coloring matter being removed by animal charcoal; it is then boiled and filtered while at the boiling temperature. Upon cooling the sulphate is deposited in the form of white feathery acicular crystals of a silky lustre, odorless, with a bitter taste and a neutral reaction. It is soluble in water and alcohol.

*Medical Properties and Action of the Salts of Morphine.* The salts of morphine possess anodyne, hypnotic and antispasmodic properties, and are less stimulating, less convulsant, and more hypnotic and anodyne than opium, and they also produce less constipation, and less diaphoretic action than opium. After the administration or insertion of the ordinary dose, which is one-sixth to one-fourth of a grain, there is experienced a sense of heat and flushing of the face; which may be preceded by some pallor, a fullness of the head, giddiness, noise in the ears, and frequently nausea, sometimes epigastric pain. The vertigo may cause a staggering walk and inability to maintain an upright position. Injection of the conjunctiva and contraction of the pupils occur at the same time that the cerebral effects are felt. The lips have a bluish appearance, the mouth and tongue dry, deglutition is painful and the voice becomes husky. During these symptoms the anodyne effects are manifested by the relief of pain and spasm, with perfect calmness of mind and tranquillity. While the effect is generally hypnotic, yet in some cases there is extreme wakefulness, with great mental activity, and when sleep occurs, instead of its being calm, the respirations are slow, noisy and labored, the patient being disturbed by dreams and visions. While the action of the heart is diminished in frequency, there is a considerable rise in the arterial tension. When a hypodermic injection of morphine has been made there is experienced an itching of the nose, which may extend to the entire cutaneous surface. The skin, which is at first dry, becomes moist, from

diaphoresis, which is sometimes profuse. The secretions of the mucous surface are also arrested as a primary effect.

If morphine is administered after a full meal, its effect is to suspend digestion for some time, and also to temporarily arrest the intestinal movements and diminish the urinal discharge, and make its emission difficult, on account of the temporary loss of contractile power of the bladder and of the ejaculatory muscles. When the narcotic effects of morphine decline, there is generally experienced headache, confusion of mind, anorexia and nausea. When a poisonous dose is administered, a profound state of narcotism quickly ensues, the pulse becomes slow and feeble, the respiration slow and indistinct, the skin cold and covered with perspiration, the face pale, blue and ghastly, the conjunctiva deeply injected, the pupils greatly contracted, and reflex movements entirely destroyed. Half a grain of morphia is the smallest dose which has proved fatal to an adult, but other cases are recorded where one grain destroyed life. It chiefly affects the cerebro-spinal functions, and causes death by paralyzing the respiratory muscles.

The antidotes in cases of poisoning are the stomach pump, emetics, cold affusions, counter-irritation, strong coffee, active stimulants, atropine by hypodermic injection, electro-magnetism, and artificial respiration.

*Therapeutic Uses.* The salts of morphine are employed in all neuralgic affections, for the relief of pain from whatever cause, and to induce sleep; also in diseases of the heart, chronic gastritis, delirium tremens, tetanus, colic, spasms, dysentery, cholera, cough of pulmonary affections, cerebro-spinal meningitis, puerperal fever, convulsive diseases, vomiting, colica pictonum diarrhœa, diabetes, gangrene, etc., etc. For hypodermic injection, the acetate of morphine is supposed to possess some advantages over the other salts, such as the sulphate and muriate, one of which is its greater solubility. Morphine is contraindicated where there is a tendency to apoplexy or coma.

*Dose.* Of the Salts of Morphine, gr. ⅙ to gr. ¼. One-sixth of a grain of either of the salts of morphine is equiva-

lent to a grain of opium, or twenty-five drops of the tincture of opium (laudanum).

For hypodermic injections the dose of salts of morphine is gr. ⅛ to ⅙.

For endermic application, gr. ½ to j of morphine may be sprinkled on a surface which has been blistered to remove the cuticle, over the seat of pain; but the hypodermic method is the most effectual.

*Dental Uses.* For dental use, the acetate of morphine and the muriate of morphine are preferable to the sulphate, on account of their greater solubility and greater chemical affinity with the tissues on which they are to act. The acetate of morphine is also preferred to the other salts as an ingredient of nerve paste for destroying the vitality of the pulps of teeth, on account of its chemical and mechanical compatibility with the pulp tissue, giving relief as an anodyne when the sulphate would irritate. Concerning the action of morphine when combined with arsenious acid, its effect is anodyne, modifying the irritant action of the arsenic, and preventing, to a considerable degree, the intense pain which follows its application to vitalized structures. Besides its use in devitalizing mixtures and as an obtunder of sensitive dentine, morphine is employed for the temporary relief of odontalgia, for such a purpose being combined with carbolic acid, sweet spirits of nitre, oil of cloves and other anodyne agents.

A paste made of morphine and creasote (or carbolic acid), is much used for obtunding the sensitiveness of dentine.

For internal administration in facial and other neuralgias, morphine is combined with atropine in the proportion of atropine, gr. $\frac{1}{120}$ to $\frac{1}{100}$; morphine, gr. ⅛ to ¼; hypodermically injected. Morphine in combination with carbolic acid is also employed to relieve the pain of an exposed and painful pulp.

DENTAL FORMULÆ.

*For Odontalgia.*

℞. Morphinæ Acetatis.....gr. xx
Creasoti, (vel Acidi Carbolici).....ʒij. M.

SIGNA.—Apply to carious cavity on a pellet of cotton.

*For Itching of Inflamed Surfaces.*

℞. Morphinæ Sulphat...gr. vj
Sodii Boratis.....ℨss
Aquæ Rosæ.....fʒviij. M.

SIGNA.—To be used as a lotion.

*To Relieve the Pain following the Extraction of Teeth, and a Local Anæsthetic.*

℞. Morphinæ.....gr. vj
Tincturæ Aconiti,
Chloroformi,
Alcoholis.....āā.....f℥ j. M.

SIGNA.—Apply on cotton, or with an applicator, as a local anæsthetic.

(See Formulæ under Arsenious Acid.)

*For Odontalgia.*

WHITE.

℞. Morphinæ Acetatis...gr. xx
Olei Caryophilli,
Spiritus Ætheris Nitrosi.....āā..... ℥ ij. M.

SIGNA.—Apply on a pellet of cotton.

*For Devitalizing Pulps of Teeth.*

℞. Morphinæ Acetatis...gr. j
Acidi Arseniosi.....gr. ij
Creasoti..... ..q. s. M.
Fiat massa.

SIGNA.—Apply a sufficient quantity to exposed surface of pulp on cotton.

## MYRRHA—MYRRH.

*Source.* Myrrh is a gum-resinous exudation from a small, shrubby tree—Balsamodendron Myrrha, of the natural order *Amyridaceæ*, growing in Arabia and the northeastern coast of Africa. It is obtained in the form of small, irregular fragments or tears, or in larger masses, composed of agglutinated portions. The juice exudes spontaneously from the stem of the tree, and concretes upon the bark. When pure, myrrh is of a reddish-yellow or reddish-brown color, translucent, with a strong, peculiar fragrant odor and a bitter aromatic taste, brittle and pulverizable. Its powder is of a light yellow color; when of a dark color, it is impure. When powdered myrrh is rubbed up for fifteen minutes with an equal weight of muriate of ammonia and fifteen times its weight of water gradually added, and it dissolves quickly and entirely, it may be considered pure.

*Medical Properties and Action.* Myrrh is stimulant, astringent, expectorant and emmenagogue. It stimulates the digestive organs and improves the appetite. In large doses of a half ounce, it causes a burning sensation in the stomach, increased arterial excitement, and profuse diaphoresis, with a great influence on the urinary passages. It diminishes discharges from mucous membranes when internally administered, and is a useful external application for relaxed tissues.

*Therapeutic Uses.* Myrrh is internally administered in chronic catarrh, humoral asthma, amenorrhœa, chlorosis, leucorrhœa, chronic bronchitis, etc., etc.; and in conbination with chalybeates and aloes in uterine affections.

Locally, myrrh is applied to inflamed, ulcerated and aphthous surfaces.

*Dose.* Of powdered Myrrh, gr. x to ℥ss, in pill or suspended in water.

Tincture of Myrrh—*Tinctura Myrrhæ* (myrrh, ℥iij; alcohol, Oij.) *Dose.* f℥ss to f℥j. Is used internally and externally.

*Dental Uses.* Myrrh, in the form of the powder and tincture, is employed as a local application to inflamed, ulcerated and spongy gums, ulcerations of mucous membrane of the mouth and throat, in the form of a gargle; also in mercurial stomatitis, indolent ulcers, aphthous sore mouth of children. The diluted tincture forms a stimulating gargle or mouth wash, and the powder is employed as an ingredient of dentifrices, for its stimulating and astringent properties.

## NITROUS OXIDE—PROTOXIDE OF NITROGEN.

### Laughing Gas.

*Formula.* $N_2O$. Sp. gr. 1.525.

*Derivation.* The discovery of nitrous oxide gas was made by Dr. Priestly in 1776, and scientific investigations demonstrating its respirability, by Sir Humphrey Davy, the results of which were published some twenty years afterwards. To Dr. Horace Wells, a dentist of Hartford, Connecticut, is due the credit of having demonstrated its property as an anæsthetic agent for the relief of pain during surgical operations, in the year 1844. Nitrous oxide is obtained by heating the salt nitrate of ammonia in a glass retort until it melts, and then boils, dissolving into a vapor of water and into a permanent gas.

The salt nitrate of ammonia is obtained in three forms—the crystallized, the granulated and the fused. The fused form is prepared by melting the crystallized nitrate of ammonia, and

allowing it to solidify on cooling; the granulated is prepared by evaporating the solution to a density sufficient to solidify on cooling, and agitating the mass until it becomes cool.

As it is very important to use a pure form of the nitrate of ammonia in the generation of nitrous oxide gas the salt, either in the fused or granulated state, may be tested by heating it on platinum, when the nitrate, if pure, should volatilize perfectly. It may also be tested by a few drops of chloride of barium, which should not give a precipitate when added to the nitrate of ammonia; should it do so, then sulphuric acid is present; or, the nitrate of ammonia may be tested by a solution of nitrate of silver, which will also give a precipitate, if chlorine is present. The test with nitrate of silver may be made by dissolving a drachm of the nitrate of ammonia in half a glass of distilled water and adding a few crystals of the nitrate of silver. If the nitrate of ammonia is pure, the solution will remain perfectly clear, but should chlorine be present, it will show a clouded appearance, and should be discarded, as it is not fit to generate the gas from.

The salt nitrate of ammonia is a white, crystalline substance, formed by neutralizing dilute nitric acid by means of carbonate of ammonia, and is so constituted as to be resolved into nitrous oxide and water. A pound of the salt will generate about thirty gallons of the gas. In generating nitrous oxide gas, care must be taken to preserve its purity; consequently it becomes important to maintain, as nearly as possible, an equal temperature during its manufacture, and should any *nitric oxide* —binoxide of nitrogen—be formed, which may be done by too high a heat under the retort, it is necessary to remove it and other impurities, by the aid of solutions of caustic potash and copperas; the caustic potash neutralizing any free nitric acid present, and the copperas removing either chlorine or nitric oxide. The salt nitrate of ammonia is perfectly fused at 226° F. emits white fumes at 302° F. and begins to evolve gas at 460° F. At 500° F. the impurity, *nitric oxide* is given off; hence the temperature during the process should not be permitted to rise above 482° F. which can be determined by

thermometers prepared for the purpose. No red fumes should pass from the retort.

Nitrous oxide gas, as principally used at the present time, is in the form of condensed gas, being liquefied and solidified under great pressure and secured in iron cylinders, from which it escapes into an inhaling bag when needed for use, by turning a stop-cock. The advantages of the condensed form of the gas are its purity, convenience for use whenever needed, the large supply which can be kept for use, and the freedom from deterioration notwithstanding its age.

Nitrous oxide is an elastic, colorless gas, with a faint but agreeable odor, and a sweetish taste, which it imparts to water. Under a pressure of 50 atmospheres at about 45° F. it becomes a clear, colorless liquid, and at about 150° F. below zero, it freezes into a beautiful, clear, crystalline solid. By the evaporation of this solid, a degree of cold may be produced far below that of carbonic acid bath in vacuo, or lower than 170° F. The washing of nitrous oxide gas, and the retention of it over water for any length of time, is attended with considerable loss, as much of it is absorbed, especially if the water is cold; such loss may be avoided to a great extent by using water of an elevated temperature or a strong solution of common salt. The impurities of nitrous oxide gas are air, water, nitric oxide or binoxide of nitrogen, chlorine and hyponitric acid. The mixture with air, which may occur in the receiver or when the patient is inhaling the gas, merely dilutes it, as does also the vapor of water. Nitric oxide, however, is a dangerous impurity, and with others may be generated even when pure nitrate of ammonia is used in preparing the gas; this impurity is also one of the most difficult to separate from the gas. Like nitrous oxide, nitric oxide is a colorless gas, lighter and less soluble in water, and if it is generated, is liable to pass through the washing solutions into the gasometer or receiver; nitric oxide, however, need not be generated if the proper care is observed with regard to the degree of heat under the retort which contains the nitrate of ammonia.

Chlorine is also a dangerous impurity, and may be set free

if the salt nitrate of ammonia contains muriate of ammonia (sal-ammoniac), and chloride of ammonium. To prevent such contamination the tests of the salt before referred to may be made. Nitrous oxide gas supports combustion with almost the same promptness as pure oxygen; and although nearly identical in constitution with atmospheric air, it differs from it both in the proportion of its constitutional elements and in the manner of their association. Nitrous oxide contains about one-third of oxygen to two-thirds of nitrogen, while atmospheric air has only about one-fifth of oxygen to four-fifths of nitrogen.

Again, in nitrous oxide, the elements nitrogen and oxygen are in chemical combination with each other, while in atmospheric air there is no apparent chemical union whatever.

*Medical Properties and Action.* Nitrous oxide gas is not only the most pleasant, but is the safest general anæsthetic in use, and the greatest objection to its administration is the very short anæsthetic stage which it induces, unless the inhalation of the gas be continued, which is impossible in operations upon the mouth. When inhaled, the first effect is dizziness, with ringing noises in the ears, a tingling sensation, extending to the extremities, an uplifting of the whole system, followed by fullness or expansion of the chest, and a loss of sensation throughout the entire body. According to the temperament, the stage of excitement is transient or prolonged; in some cases there are strange illusions, with a form of intoxication, which may be manifested by declamation, singing, laughing or crying, or melancholy, with a disposition at times to assault all near. Such effects, if the administration is interrupted, soon pass off. For surgical operations, the gas is given with less admixture of the air, and the inhalation persisted in until the stage of excitement is overcome and insensibility produced, when the face becomes extremely pale, the respirations, at first shallow, become deep and stertorous, the jaw fixed, the eyes protruding, and a bluish and purplish color about the lips and face, the patient presenting a very alarming and death-like appearance, a condition of which Bartholow

says, "So far as the exterior phenomena can afford any indication of the nature of the action, is *an asphyxiated state.* The blood ceases to be oxygenated, carbonic acid accumulates, and the centres of conscious impressions are rendered inactive in consequence of the deficient supply of oxygen and the excess of carbonic acid. The rational indications of the nature of the narcosis produced by nitrous oxide are confirmed by physiological experiment. It has been found that the exhalation of carbonic acid is decidedly diminished by the inhalation of nitrous oxide, and that animals live no longer in an atmosphere of this gas than in an atmosphere of hydrogen." The same author speaks of the fatal cases that have occurred, as being with propriety attributable to the lethal action of this gas, and refers to various cases under his own observation in which nervousness, vague mental symptoms and headache, have been experienced after the inhalations ; at the same time he pronounces nitrous oxide to be almost free from danger. There is no doubt but that the prompt action of nitrous oxide gas, and the rapid subsidence of the narcosis, have much to do with its safety, and account for the impunity with which it is used. Nitrous oxide gas has the advantages of safety ; also rapid anæsthesia, which is generally induced in from thirty seconds to a minute and a half, insensibility often occurring before complete unconsciousness ; also the pleasant odor and taste, thereby preventing repugnance and nausea ; and the complete recovery from its influence without unpleasant after effects. It generally requires six gallons or less to produce anæsthesia with nitrous oxide gas ; hence the rubber bag from which it is inhaled should have a capacity of about eight gallons.

*Mode of Administration.* The most improved apparatus consists of an iron cylinder containing 100 gallons or more of the condensed or liquefied nitrous oxide, to which is attached a rubber gas bag and inhaling tube with a double valve and mouth-piece. The patient, for dental operations, is seated in a suitable chair which will admit of the back being lowered to such a degree as will bring the patient to an almost hori-

zontal posture, and the head well supported. A piece of India-rubber or a firm cork to which a thin, strong cord is attached, to prevent its slipping down the throat, is placed between the teeth, so as to prevent the closure of the jaws, for, unlike chloroform and ether, the muscles become rigidly contracted under the influence of this gas; such a prop also prevents injury to the front teeth by the patient biting too hard upon the mouth-piece of the inhaling tube. The patient is then directed to breathe deeply and regularly, the nose being held to prevent the admixture of atmospheric air, and the same precautions observed as are necessary when administering ether or chloroform. (See Ether). The anæsthetic state, or "surgical period," as it is termed, is generally manifested by snoring, although this symptom does not invariably occur; when it does, however, it indicates a state of profound anæsthesia, to which it is not necessary to carry the patient in performing many minor surgical operations.

As more or less excitement follows the inhalation of this gas, when it is largely mixed with atmospheric air, such a condition is either prevented or abbreviated by holding the nose of the patient during the inhalation. The patient should not partake of food for at least two hours before the administration of the gas, but at the same time should not be in a weakened condition from the want of it; and the dress, if tight, should be previously loosened, and as soon as the operation is completed the head should be gently moved to one side, to allow the blood to escape from the mouth. Fresh air should then be admitted into the room, and the patient supplied with it by means of a fan.

*Therapeutic and Dental Uses.* According to the investigations of Dr. Ziegler, nitrous oxide is an efficient restorative when administered either in its gaseous state by the lungs, or in conjunction with liquids by the alimentary canal. He recommends the use of this gas in moderate quantities, so as not to generate too much carbonic acid. Regarding nitrous oxide and oxygen as of primary importance in asphyxia, and the natural antidotes to narcotizing agents and asphyxiated

conditions, he advocates their use whenever practicable, either alone or in combination with heat, and claims that they will often save life in apparently hopeless cases.

The rapid action of nitrous oxide and the transient nature of its effects on the system, render it a very useful anæsthetic agent for all minor surgical operations—such as extracting teeth, lancing abscesses, devitalizing nerves of teeth, etc., etc. It has also been successfully employed in the performance of some capital surgical operations, where the anæsthesia has been kept up from fifteen minutes to half an hour. It has recently been recommended to use during the first part of an inhalation, the pure nitrous oxide gas, and for the purpose of prolonging the anæsthesia with less danger, to dispense with the pure gas and administer a mixture of oxygen and nitrous oxide in proportions very similar to the air we breathe.

## OLEUM AMYGDALÆ DULCIS—OIL OF SWEET ALMONDS.

*Derivation.* The oil of sweet almonds is obtained by first depriving the almonds of the brown powder adhering to their surface, and rubbing them together in a piece of coarse linen, grinding them in a mill or mortar, and then submitting them to pressure in canvas sacks between slightly heated plates of iron. The oil, which is at first turbid, is clarified by rest and filtration. It is clear, colorless, or of a slight greenish-yellow tinge, nearly inodorous, with a bland, sweetish taste. It will remain liquid at temperatures below the freezing point of water.

*Medical Properties and Action.* The oil of sweet almonds is demulcent.

*Therapeutic Uses.* It is employed as an emulsion in pulmonary affections with cough, and as a vehicle for other medicines.

*Dental Uses.* The oil of sweet almonds forms a pleasant and soothing application for excoriations of the lips and inflamed mucous membranes; also for a soothing application to the small, simple, but painful ulcers which sometimes appear upon the gums, mucous membrane of the cheeks, and the

tongue. Almond mixture—*Mistura Amygdalæ*—is made by dissolving a mixture of half an ounce of blanched sweet almonds, 30 grains of gum arabic and 120 grains of sugar, in half a pint of distilled water. It forms a pleasant demulcent.

## OLEUM CAJUPUTI—OIL OF CAJUPUT.

*Source.* The volatile oil of the leaves of melaleuca cajuputi, a tree indigenous in Batavia and Singapore. It is transparent, of a green color, with an odor like camphor, and a warm, pungent taste.

*Medical Properties and Action.* Cajuput oil is a diffusible stimulant, antispasmodic and diaphoretic. Internally administered, it causes a sensation of warmth in the stomach, and excites the action of the heart and arteries, afterwards producing copious diaphoresis. Externally, either alone or in combination with equal parts of soap liniment or olive oil, it is an efficient rubefacient and stimulant embrocation. Its use is becoming more common.

*Therapeutic Uses.* It is employed internally as an antispasmodic stimulant in typhus and other low fevers, spasmodic cholera, gout and rheumatism, neuralgic affections, hysteria, flatulence and flatulent colic, headache, nausea, etc. Externally, in neuralgia, headache, gout, rheumatism, lumbago, sprains, contusions, paralysis, etc., etc.

*Dose.* Of Cajuput Oil, gtt. j to gtt. v., in emulsion, or on sugar.

*Dental Uses.* Cajuput Oil is an efficacious remedy for the relief of odontalgia, applied on lint or cotton to the carious cavity of the tooth; also in neuralgic affections, if they are not connected with inflammatory action.

## OLEUM CARYOPHILLI—OIL OF CLOVES.

*Source.* Oil of cloves is obtained from the dried flower buds of the caryophillus aromaticus, an evergreen tree, of the natural order Myrtacea—myrtle order—a native of the Indies. The unexpanded buds are of a dark brown color, with a yellowish red tint.

The oil is prepared by distilling cloves with water, to which common salt is added, in order to raise the temperature to the boiling point. It has a fragrant odor and a hot, acrid taste.

*Medical Properties and Action.* Oil of cloves contains tannic acid, a pungent volatile oil, resin, etc., and two substances —a hydro-carbon *caryophillin*, and an oxygenated oil, *eugenol*, called an acid on account of its possessing acid properties. Oil of cloves is an aromatic stimulant, and a powerful stimulant. Although it is a very fluid, clear and colorless preparation when fresh, it becomes yellow by exposure, and ultimately reddish brown, with the odor of cloves and a hot, aromatic taste. Like cloves, the oil acts less upon the system at large than on the part to which it is immediately applied.

*Therapeutic Uses.* Oil of cloves is sometimes administered to relieve nausea and vomiting, to correct flatulence, and excite digestion when languid; but its chief use is to modify the action of other medicines.

*Dose.* Of oil of cloves, gtt. ij to gtt. vj.

*Dental Uses.* In dental practice, oil of cloves is employed to relieve odontalgia, either alone, as in the form of a drop or two upon cotton, introduced into the carious cavity of a tooth, and obtunds the pain by an over-stimulating effect upon the irritable pulp. It is also employed for the same purpose in combination with other agents, such as morphia, sweet spirits of nitre, etc. When the use of creasote or carbolic acid is prohibited, owing to the patient's idiosyncracy, the oil of cloves may be substituted.

The oil of cloves has also the effect of rendering creasote and carbolic acid more pleasant, without interfering with their action, being added in equal admixture. It is also employed in the treatment of alveolar abscess, being applied like creasote or carbolic acid.

## OPIUM—OPIUM.

*Source.* Opium is obtained from the unripe capsules of the papaver somniferum, of the natural order *Papaveraceæ*—Poppy order, in the form of a concrete juice, which exudes from incisions, and which is permitted to evaporate spontaneously. Commercial opium is in the form of irregular masses, of from a few ounces to several pounds in weight, with a moist, brown or chestnut surface and a peculiar odor and nauseous taste. The purest form should have a chestnut color, a strong aromatic flavor, and a dense consistence, and break with a deeply notched fracture, and when drawn across white paper leave an interrupted line. The alkaloid morphine is the most important of the chemical constituents of opium. (See Morphine.)

*Medical Properties and Uses.* As an anodyne and hypnotic opium possesses the power of relieving pain and inducing sleep; it relaxes muscular spasm, and hence is a very efficient remedy in tetanus, spasms, nervous irritability, and discharges of a morbid nature. It excites the circulation as a first action, and increases the temperature of the skin, and causes an agreeable exhilaration of the intellectual faculties, so much so as to be used by some as an habitual narcotic, which is finally destructive to both the physical and mental functions. But the stage of excitement is very transient, and is succeeded by a falling of the pulse, a diminished susceptibility to external impressions, confusion of mind and the loss of consciousness in deep sleep. Other effects are also manifested, such as dryness of the throat, thirst, and, in some cases, nausea and vomiting, with an itching miliary eruption on the skin.

Taken in large or poisonous doses, opium does not cause any excitement, but giddiness and stupor rapidly supervene, with a lessening in the frequency of the pulse, but not in fullness, a tendency to sleep which is irresistible, and finally coma, in which the breathing is heavy and stertorous, the pulse slow, and the pupils contracted, with a sinking of the pulse and relaxation of the muscles immediately preceding

death; in the case of children death is often preceded by violent convulsions.

The antidotes in poisoning by opium are the stomach pump, emetics in double doses, such as sulphate of zinc, in doses of gr. xx to gr. xxx, or sulphate of copper, gr. v to gr. x; also mustard in powder, ℥ss, or powdered alum, answer as emetics, strong coffee, keeping the patient in motion, counter-irritation to nape of neck, flagellation to the palms of the hands and soles of the feet, and the electro-magnetic battery, which is often efficient when other measures fail, artificial respiration, and belladonna, in hypodermic injections of its alkaloid atropine, in solution. No local lesions are found after death.

*Therapeutic Uses.* Opium as an anodyne and hypnotic is employed in almost all diseases where the necessity of assuaging pain and inducing sleep is required. (See Morphine.) Opium is contra-indicated where there is a tendency to apoplexy or coma, or where an unusual susceptibility to its influence exists, and it should be administered to the very young and very old with great caution. When long administered it is necessary to increase the dose. Externally, in the form of powder, it is applied to irritable ulcers, etc., and to the rectum, as suppositories.

*Dose.* Of Opium, in powder or pill, as an anodyne and hypnotic, gr. j.

*Dental Uses.* Opium is employed as an anodyne in convulsions of teething, but must be administered with great care and in small doses; also as an anodyne preparatory to lancing the gums of children; also in mercurial salivation, to arrest the excessive secretion, in doses of gr. j every four hours; also in neuralgia; but it is inferior to aconite. A small lump of opium in contact with an aching tooth pulp will relieve the pain, or the powder may be used for the same purpose. In the form of the wine and tincture, opium is serviceable in odontalgia, dental periostitis, inflamed gums and mucous membrane of the mouth; in injections, for alveolar abscess, when it is often used in combination with tincture of iodine. The wine

of opium is a more soothing and pleasant application than the tincture of opium.

Vinum Opii—*Wine of Opium*, is obtained by macerating two ounces of powdered opium, together with cinnamon and cloves, in one pint of white wine. *Dose*, ♏v to ℥j.

*Dental Uses.* Employed as a soothing and anodyne application to inflamed and tender gums and mucous membrane, odontalgia, ulcerations of mouth, alveolar abscess, dental periostitis, pulpitis, etc.

Tinctura Opii—*Tincture of Opium*—laudanum, is composed of powdered opium, ℥iiss; diluted alcohol, Oj. Dose, ♏xiij, or 25 drops, equivalent to one grain of opium. Its strength increases with age.

One drachm of the tincture contains 120 drops. The dental uses are the same as for wine of opium, but the latter is the most pleasant application for the mouth.

Tinctura Opii Camphorata—*Camphorated Tincture of Opium*—paregoric elixir, is prepared by macerating sixty grains of opium in two pints of diluted alcohol, with sixty grains of benzoic acid, a fluidrachm of oil of anise, two ounces of clarified honey, and forty grains of camphor. *Dose*, f℥j to f℥j or a tablespoonful, containing a little less than one grain of opium. Dose for an infant, gtt. v to xx. This is an agreeable preparation for children.

Tinctura Opii Deodorata—*Deodorized Tincture of Opium*, is composed of the watery extract of opium, washed with ether, which is afterwards separated, and the residue dissolved in water and mixed with enough alcohol to preserve it. This preparation of opium is free from the narcotina and many other injurious ingredients of opium, and is a valuable preparation. *Dose*, ♏v to f℥j, or 25 drops.

## PEPSINUM—PEPSIN.

*Source.* Pepsin is obtained by digesting the mucous membrane of the stomach of the pig, calf or sheep, which has been scraped off, chopped finely, and macerated for several days in water, in a solution of muriatic acid, from which the pepsin is

precipitated with chloride of sodium. The medicinal preparation is in the form of a nitrogenized, light, amorphous, grayish-white or fawn-colored powder, soluble in water and alcohol, and of a peculiar odor and bitter, nauseous taste. When quite pure, it is both tasteless and inodorous. When decomposed by heat it no longer possesses digestive properties, and much of what is sold is almost or wholly inert. Pure pepsin is an artificial digestive.

*Medical Properties and Action.* Pepsin is an essential constituent of the gastric juice, and digests the nitrogenous constituents of the food, converting them into peptones. Taken internally, as a medicinal preparation, pepsin increases the appetite and allays irritability of the stomach. It should be administered immediately before meals, and no hot food taken for some time afterwards.

*Therapeutic Uses.* Pepsin is employed in dyspepsia, gastralgia, obstinate vomiting, infantile diarrhœa, apepsia of infants, vomiting of pregnancy, cancer and chronic ulcer of the stomach, anæmia, chlorosis, atrophy, etc. Externally, it is injected into cancerous tumors and morbid growths with the hypodermic syringe, to retard their progress.

*Dose.* Of Pepsin suspended in syrup, Saccharated pepsin—*Pepsinum saccharatum*—gr. v to gr. x. Syrup of orange peel will disguise its odor. *Vinum Pepsini.* Dose, ℥ss to ℥j. *Glycerinum Pepsini.* Dose, ℥ss to ℥j.

Both the saccharated pepsin and the glycerole are unchangeable.

Pepsin appears to be especially efficient in cases of children; and when pepsin and a small quantity of hydrochloric acid are added to animal broths given by the rectum, in cases where food is rejected by the stomach, such nourishment is very beneficial.

*Dental Uses.* In dental practice, pepsin is successfully employed in the treatment of putrid pulps of teeth, as an antiseptic and deodorizer. In the form of a thin paste made by mixing pepsin with water containing some two per cent. of hydrochloric acid, it is introduced into the pulp canal after the

removal of the decomposed matter, and confined by a temporary filling in the crown cavity, being permitted to remain for twenty-four hours, when it is removed and the canal syringed with tepid water, and, if necessary, the application of the pepsin paste repeated until the odor of decomposition can no longer be detected. Pepsin, in the form of the paste, is also applied to partially decomposed dentine, which may, for good reasons, be permitted to remain immediately over the pulp of the tooth, as the action of the pepsin is confined to dead matter alone.

DENTAL FORMULÆ.

*For Suppurating Dental Pulps.*
(OAKLEY COLES.)

℞. Acidi Hydrochlorici....♏j
Aquæ Destillatæ.....♏xl
Pepsini Porci.....q. s.
To make a paste.

SIGNA.—To be applied to suppurating pulps.

*For Indigestion.*
(MIALHE.)

℞. Pepsini.....ʒiss
Aquæ.....fʒviss
Vini Xerici.....fʒxiiss
Alcoholis.....fʒiij
Sacchari.....℥j.
Solve et cola.

SIGNA.—A tablespoonful immediately after each meal.

## PLUMBI ACETAS—ACETATE OF LEAD.

### SUGAR OF LEAD.

*Formula.* $Pb_2C_2H_3O_2, 3H_2O$.

*Derivation.* Acetate of lead is obtained by immersing lead in distilled vinegar, or litharge in pyroligneous or crude acetic acid; when the acid has become saturated, the solution is permitted to cool and crystallize.

Acetate of lead is a white salt, in the form of beautiful, brilliant, needle-shaped crystals, like long prisms, which effloresce on exposure to the air. It has a sweet, astringent taste, and an odor of acetic acid, and is soluble in water and alcohol.

*Medical Properties and Action.* Acetate of lead is sedative and astringent, checking the secretions and reducing the activity of the capillary system, and diminishing the force and frequency of the pulse. Like all the salts of lead, it is an irritant and corrosive poison, causing gastro-enteric inflammation. It requires, however, a large quantity (not less than half an

ounce) of the acetate of lead to destroy life, as much of it is rejected by vomiting. The symptoms of lead poisoning, when the lead is slowly introduced into the system, are loss of appetite and strength, wasting of flesh, paleness of the face, constipation, pain in the joints, dry colic, which is relieved by pressure, neuralgia of the abdominal muscles, contraction of the intestines, belly drawn towards the spinal column, contraction of the liver, jaundiced skin, yellow conjunctiva, urine colored with biliary coloring matter, a blue line along the margin of the gum, about the incisor teeth ; also at times a bluish discoloration of the mucous membrane of the lips and mouth, dimness of vision, paralysis of the extensor muscles of the fingers and arms, death resulting from the gradual failure of nutrition and the paralysis of the muscles of respiration.

When the poisonous dose is large, there is intense gastric irritation, numbness, paralysis, coma, and collapse. Iodide of potassium in large doses, also Epsom salts and sulphur baths, are the antidotes in chronic cases of lead poisoning, and for the lead colic, alum in doses of one or two drachms every three or four hours, dissolved in some demulcent liquid, is considered to be the best remedy. For the treatment of lead paralysis, strychnia and electricity are employed. The blue or slate-colored line on the gums is supposed to be due to a deposition of the sulphide of lead.

*Therapeutic Uses.* Acetate of lead is internally administered in dysentery, diarrhœa, cholera, cholera morbus, phthisis, chronic bronchitis, pneumonia, diseases of the heart, hemorrhage from the lungs, stomach, kidneys, nose, etc. ; diseases of the eye, erysipelas, skin diseases, chronic gastric catarrh, gastralgia, pyrosis, summer diarrhœa of children, humid asthma, whooping cough, etc. ; but the danger of producing toxic effects must be remembered in its internal use.

Externally, solutions of lead are employed to relieve superficial inflammations, arrest morbid discharges, and allay the pain of acute inflammations. Lead should not be given with natural waters containing lime, carbonic acid, mineral acids and

salts, vegetable acids, or vegetable astringents, iodide of potassium, and preparations of opium.

*Dose.* Of Plumbi Acetas, gr. ss or j to gr. v, two or three times a day.

Liquor Plumbi Subacetatis Dilutus—*Diluted Solution of Subacetate of Lead.—Lead water* is composed of subacetate of lead solution, f℥ij; distilled water, Oj; and is a mild astringent and sedative when applied externally; it is never prescribed internally. It arrests discharges from suppurating and ulcerated mucous surfaces, and promotes the resolution of acute superficial inflammations.

*Dental Uses.* Lead water is employed in dental practice, to relieve inflamed gums and mucous membrane of the mouth; as an application to indolent and foul ulcers; also in the treatment of teeth after the devitalization and removal of the pulps, to prevent periosteal trouble.

It proves serviceable when applied to chapped hands and lips. A good ointment for such a purpose is composed of a combination of lead water, camphor, white wax and oil of almonds.

DENTAL FORMULÆ.

*For Acute Inflammation of the Mucous Membrane of the Mouth and the Gums.*

℞. Plumbi Acetatis..... ʒj
Tinct. Opii..... ℥ss
Aquæ..... ʒx. M.

Signa.—Apply as a lotion, on lint.

*For Chapped Hands and Lips.*

℞. Liq. Plumbi Subacetatis Dilutus..... ℥vj
Camphoræ.....gr. xl
Ceræ Albæ..... ℥viij
Olei Amygdalæ Dulcis...Oj. M.
Fiat Cerat.

Signa.—Apply as an ointment.

## POTASSA CAUSTICA—CAUSTIC POTASSA.

Hydrate of Potash—Fused Potash—Oxide of Potassium.

*Formula.* HKO.

*Derivation.* Caustic potash is prepared by boiling a solution of potash until ebullition ceases, and the potassa melts or assumes a solidified consistence, when it is poured into suitable moulds and kept in well-stopped bottles, as it rapidly deliquesces when exposed to the air. It dissolves in water and

alcohol, and attracts moisture. Its officinal form is that of sticks of a white and somewhat transparent color, but upon exposure to the air, or if it is impure, it becomes a dingy gray, greenish or bluish color, and has the odor of slaking lime. When it is digested in alcohol, so as to free it from such impurities as are insoluble in alcohol, it is called *alcoholic potassa.*

*Medical Properties and Action.* Caustic potash is the most powerful caustic and escharotic in use, and, when taken internally, is a corrosive poison. It is only employed externally. When applied to a part, it rapidly destroys its vitality to a considerable depth, differing in this respect from nitrate of silver (lunar caustic), as the latter is more limited in its action, and does not liquefy when it comes in contact with the tissues. From the penetrating action of caustic potash, it is necessary to use it with great care. It is very deliquescent, which is a great objection to its use in some cases, but when mixed with an equal quantity of lime, the deliquescent action is in a measure prevented; it is then known as *potassa cum calce*—potassa with lime, and is in the form of a grayish-white powder, which is sometimes made into a paste, under the name of *Vienna Paste*, which is milder and less deliquescent.

*Therapeutic Uses.* Caustic potassa is chiefly employed to open abscesses, and in the treatment of chancres, hospital gangrene, eczema, malignant growths, to arrest the sloughing of carbuncles; in tetanus, applied to the spine; bites of rabid animals and venomous reptiles; phlegmons and incipient carbuncles, to arrest their progress; to form issues, etc. To prevent its coming in contact with neighboring parts a piece of adhesive plaster is used, with an opening corresponding in size to the surface on which the caustic is to act. When mixed with water, in the proportion of caustic potash, ℥iss to water, f℥ij, it forms a rubefacient solution.

*Dental Uses.* In dental practice, caustic potassa is employed in gangrene of the mouth (cancrum oris), malignant growths, fungous growths of gum, ulcers, etc.; for opening abscesses, when it is not prudent to use the lancet.

## POTASSII BICARBONAS—BICARBONATE OF POTASSIUM.

*Formula*, $KHCO_3$.

*Derivation.* Bicarbonate of potassium is obtained by passing carbonic acid through an aqueous solution of carbonate of potassium, until it is completely saturated. The solution is then filtered and evaporated, the product being bicarbonate of potassium, in the form of transparent, colorless crystals, of the shape of irregular eight-sided prisms. It is inodorous, with a saline and somewhat alkaline taste, and is soluble in water, but insoluble in alcohol. Its incompatibles are acids and acidulous salts, etc.

*Medical Properties and Action.* Bicarbonate of potassium is antacid, diuretic and antilithic. In large quantities it is a corrosive poison.

*Therapeutic Uses.* It is employed internally in acute rheumatism, gout, and uric acid lithiasis, diseases of the skin, calculous affections, etc., etc.

*Dose.* Of Bicarbonate of Potassium, gr. v. to ℈j.

*Dental Uses.* Bicarbonate of potassium is employed in dental practice, as an antacid, a solution being serviceable as a mouth-wash, to prevent injury to the teeth from acid medicines.

## POTASSII BROMIDUM—BROMIDE OF POTASSIUM.

*Formula.* KBr.

*Derivation.* Bromide of potassium is obtained by adding a solution of pure carbonate of potassium to a solution of bromide of iron. The iron being precipitated, the bromide of potassium is obtained from the solution by evaporation. It is in the form of white crystals, without odor, wholly soluble in water, and but sparingly soluble in alcohol, and having a pungent, saline taste.

*Medical Properties and Action.* Bromide of potassium is stimulant, sedative, narcotic and antispasmodic, and, being absorbed into the system, can be detected in the blood, urine,

fæces and mucus. If administered in considerable quantity, the action of the heart, respiration, and the temperature are depressed, and although in some cases a transient excitement may be caused by large doses, the effect of this agent is to induce a sound and refreshing sleep, and if its use is long continued, a constant drowsiness is experienced. Bromide of potassium also has the power of lessening the sensibility to pain, especially causing a loss of sensibility of touch in the case of the mucous membrane and skin, which is due to the local action of the salt, as it is eliminated. The long continued use of this agent also causes a loss of motion, and if it is injected into the tissues of a limb, it will cause paralysis of motion and sensibility. It also diminishes the sexual feeling, and the condition which a long course of the bromides develop is known as *bromism*, which is characterized by weakness of mind, confusion, headache, pallor and anæmia, uncertain gait, etc.

*Therapeutic Uses.* Bromide of potassium is employed as an internal remedy in cerebral affections, acute rheumatism, cholera infantum, sea sickness, vomiting of pregnancy; affections of the heart, as shown by increased action; neuralgia, maniacal excitement, tetanus, strychnia poisoning, epilepsy, spasmodic asthma, spasmodic cough, etc., etc.

*Dose.* Of Bromide of Potassium, gr. v to ℥j.

*Dental Uses.* Bromide of potassium is a useful remedy in infantile convulsions from the irritation of dentition, and is also efficacious in preventing such conditions by relieving the irritation; also in neuralgia, due to diseased teeth.

As its local effect is to diminish sensibility, it has been applied to the pharynx and velum palati, in order to prepare such parts for the taking of impressions for artificial palates.

## POTASSII CHLORAS—CHLORATE OF POTASSIUM.

*Formula,* $KClO_3$

*Derivation.* Chlorate of potassium is obtained by passing an excess of chlorine through a solution of carbonate of potassa and slaked lime; the chlorine being converted into chloric acid by the hydrogen of the lime and the acid com-

bining with the potassa, forming chlorate of potassium. It is in the form of colorless or white crystals, of a pearly lustre, altogether soluble in distilled water, and in twelve parts of cold and two parts of boiling water. It is inodorous, with a cool, saline taste, and when applied to animal fluids does not decompose them nor undergo any change, although perfectly soluble in such fluids. It is absorbed by the blood, and is eliminated by the kidneys.

*Medical Properties and Action.* Chlorate of potassium is detergent, refrigerant, diuretic, and stimulant, and its action as a refrigerant and diuretic is similar to that of nitrate of potassa. It improves the appetite, and on account of the large quantity of oxygen it contains has been employed in contaminated conditions of the blood as an oxidizing agent. Although it may be administered with impunity in very large doses, yet excessive quantities have given rise to gastro-enteric inflammation, with fatal effects.

*Therapeutic Uses.* Chlorate of potassium is employed in continued and typhoid fevers, neuralgia, croup, diphtheria, sore throat, chronic bronchitis, phthisis, scrofula, erysipelas, scurvy, mercurial salivation, etc., etc. Externally, it is employed in the treatment of ozæna, sore throat of scarlatina, pharyngitis, cancerous sores, ulcerated surfaces, fetid and scrofulous ulcers, etc., etc.

*Dose.* Of Chlorate of Potassium gr. v to ℈j, every three or four hours; for children—gr. iij in sweetened water every four hours for a child three years of age; gr. v for one of eight or nine years, with due attention to the bowels and constitution, regulating the former and supporting the latter. In the case of teething children, gr. ij may be administered to a child of one year of age.

*Troches of Chlorate of Potassium* are prepared by a combination of chlorate of potassium, ʒv; sugar, ʒxviij; tragacanth, ʒij; vanilla, gr. xxx; mixed together with water into a mass and divided into 480 troches, each of which contains gr. v of chlorate of potassium; useful for sore throat, etc.

*Dental Uses.* Chlorate of potassium is a valuable agent in

dental practice as an internal and external resolvent and detergent remedy in the various forms of stomatitis—inflammation of the gums, aphthæ and other ulcerative affections, gangrenous stomatitis, mercurial stomatitis, erysipelatous inflammation of the mouth, scurvy, ulcers of the gums, cheeks and tongue, abraded surfaces of mucous membrane, secondary syphilitic ulcerations of the mouth, indolent and scrofulous ulcers, etc., for such purposes being used alone in the form of mouth-washes or gargles, or in combination with tannic acid, alum, borax, glycerine, etc. In the treatment of mercurial stomatitis, great benefit is derived from both its internal and external use. For the inflamed gums of teething children, it is employed as a lotion, with beneficial effects. In the form of powder, it is a useful application to ulcerated and abraded surfaces. A simple gargle or mouth wash may be made by dissolving one drachm of chlorate of potassium in four ounces of water, or half an ounce may be dissolved in a pint of water.

## DENTAL FORMULÆ.

*For Inflamed Gums, Mucous Membrane, etc.*

℞. Potassii Chlorat.....ʒj
Sodii Biboratis.....ʒj
Aquæ Destillatæ.....ℨ ij. M.

SIGNA.—To be used as a mouth wash or gargle.

*For Ulceration and Inflammation of the Gums and Mucous Membrane.*
(STOCKEN.)

℞. Potassii Chloratis.....ʒ ij
Sodii Biboratis.....ʒj
Potassii Nitratis.....ʒ ss
Aquæ Destillatæ.....ℨ viij. M.

SIGNA.—To be used as a gargle.

*For Aphthous and Secondary Syphilitic Ulcerations of the Mouth and Fauces.*

℞. Potassii Chlorat.....ʒ iv
Aquæ Destillatæ.....ℨ x. M.

SIGNA.—To be used as an antiseptic mouth wash.

*For Ulceration of the Mouth.*
(BARTHOLOW.)

℞. Potassii Chloratis.....ʒj
Acidi Carbolici.....ʒ ss
Aquæ Destillatæ.....ℨ iv. M.

SIGNA.—To be used as a lotion.

*For Inflamed Gums and Mouth.*

℞. Potassii Chlorat.....ʒ ij
Pulv. Aluminis.....ʒ ij
Aquæ Destillatæ.....ℨ x. M.

SIGNA.—To be used as a gargle.

*For Ulcers and Suppurating Wounds.*

℞. Potassii Chloratis.....pt. j
Glycerini.....pts. x. M.

SIGNA.—To be applied as a lotion.

*For Inflamed Mucous Membrane.*

℞. Potassii Chlorat.....ʒj
Aluminæ Sulph.....ʒj
Aquæ Destillatæ.....ℨ iv. M.

SIGNA.—To be applied as a mouth wash.

*For Inflammation of Gums and Mucous Membrane.*

(STOCKEN.)

℞. Potassii Chloratis..... ʒ ij
Sodii Biboratis..... ʒ j
Potassii Nitratis..... ʒ ss
Tinct. Arnicæ..... ʒ ij
Aquæ Rosæ..... ℥ vij. M.

SIGNA.—To be used as a gargle.

*For Inflamed Gums After the Extraction of Teeth.*

℞. Potassii Chloratis..... ʒ ij
Tincturæ Krameriæ,
Glycerini.....āā.....f ℥ ss
Aquæ Rosæ..... ℥ viij. M.

SIGNA.—To be used as a gargle 6 or 8 times daily, to harden the gums.

## POTASSII NITRAS—NITRATE OF POTASSIUM.

### SALTPETRE—NITRE.

*Formula.* $KNO_2$.

*Derivation.* Nitrate of potassium is obtained in the native state in various portions of the world, but the variety employed for medicinal purposes is prepared by purifying the native production of India. It can also be artificially made by combining decayed organic animal and vegetable matters, or by the double decomposition of nitrate of sodium and chloride of potassium. The crude nitre is refined by re-solution and crystallization. It is in the form of white, crystalline, six-sided prisms, odorless, with a sharp, saline, cooling and slightly bitter taste, wholly soluble in water, but insoluble in alcohol.

*Medical Properties and Action.* Nitrate of potassium is refrigerant, sedative, antiseptic, diuretic and diaphoretic. It promotes the secretions, lessens the heat of the body and the frequency of the pulse. For allaying febrile excitement, it is frequently employed in the form of *nitrous* powders (nitre, gr. x; tartar emetic, gr. ⅛; calomel, gr. ¼ to ½).

In overdoses, nitrate of potassium causes pain and heat in the stomach, vomiting and purging of blood, inflammation of the bowels, great prostration, convulsions, and sometimes death.

The antidotes are emetics, mucilaginous and demulcent drinks, and stimulants to sustain the sinking powers of the system.

*Therapeutic Uses.* Nitrate of potassium is employed internally as a refrigerant in febrile affections; in inflammatory dis-

eases, acute rheumatism, scurvy, purpura, hæmoptysis, passive hemorrhages, asthma, etc. In fevers it is frequently combined with other remedies. The vapor is used in spasmodic asthma.

*Dose.* Of Nitrate of Potassium, gr. ij to gr. x.

*Dental Uses.* In dental practice, nitrate of potassium has been recommended in the incipient stages of alveolar abscess, being introduced into the pulp canal and secured by a temporary filling in the crown cavity of the tooth. It is also employed in inflammatory conditions of the mucous membrane of the mouth and throat, in the form of gargles.

DENTAL FORMULÆ.

*For Inflammation of the Mouth and Throat.*

(J. W. WHITE.)

℞. Potassii Nitratis.....ʒ ij to ʒ iv
Aquæ Destillatæ.....Oj. M.

SIGNA.—To be used as a gargle.

*For Inflamed Mucous Membrane and Gums.*

℞. Potassii Nitratis.....ʒ ss
Potassii Chloratis.....ʒ ij
Sodii Biboratis.....ʒ j
Aquæ Destillatæ.....ℨ viij. M.

SIGNA.—To be used as an antiseptic and refrigerant mouth wash.

## POTASSII PERMANGANAS—PERMANGANATE OF POTASSIUM.

*Formula.* $K_2Mn_2O_8$.

*Derivation.* Permanganate of potassium is obtained by the mixture of equal parts of black oxide of manganese and chlorate of potassium, with a slight excess of caustic potassa, dissolving in water, and evaporating to dryness, when it is exposed to a nearly red heat; the chlorate of potassium yields oxygen, which changes the black oxide of manganese into permanganic acid, and this acid, combining with the potassa, gives as a product the permanganate of potassium. It is in the form of dark, purple, slender prismatic crystals, inodorous, very soluble in water, forming a solution of a beautiful lilac color, even in very minute proportion, and with a sweet astringent taste.

*Medical Properties and Action.* Permanganate of potassium, when taken internally, is supposed to oxidize the blood. It is

a stimulant, mild escharotic, and is a powerful disinfectant, as it has a remarkable power of destroying fetid odors from organic sources, and proves useful in preventing the spread of infectious disease. It yields up its oxygen readily, in the form of ozone, and its use depends upon this property. It is instantly decomposed on reaching the stomach.

*Therapeutic Uses.* Permanganate of potassium is employed with advantage in dyspepsia, flatulence, excessive deposition of fat, uric acid diathesis, acute rheumatism, diabetes, scarlatina, petechial fever, spinal meningitis. Condy's fluid is a favorite preparation with some, for both internal and external use. The most important uses for permanganate of potassium are externally, as a deodorizer and disinfectant, to correct the fetor of cancer, abscesses, ulcers, caries of bone, ozæna, otorrhœa, gonorrhœa, leucorrhœa, ulcerated sore throat, etc., in the form of injections, lotions and spray. It is also used externally in the treatment of diphtheria, in the proportion of a drachm of Condy's fluid to the ounce of water. In solution, permanganate of potassium is applied in varying strength, according to the effect desired. As a local stimulant, as well as deodorizer, it is useful in chronic and indolent ulcers, carbuncles, hospital gangrene, etc. The powder may be sprinkled on gangrenous surfaces. In concentrated solution permanganate of potassium acts as a caustic. A strong solution is composed of 10 parts dissolved in 90 parts of water, and is employed in its full strength in cancerous, phagedenic and atomic ulcers. For dressing simple wounds, or as an injection in abscesses, ozæna, leucorrhœa, etc., half a fluid ounce of the solution may be added to a pint of water; in gangrenous and diphtheritic wounds and scrofulous ulcers, a fluid ounce of the solution to a pint of water.

*Dose.* Of Permanganate of Potassium for internal use, gr. ¼ to gr. j, three times a day. *Condy's Fluid* is composed of 32 grains of permanganate of potassium in one pint of distilled water; half a fluid ounce contains 1 grain. Dose of Condy's Fluid, ♏v. For external application, f℥j, to water, f℥v to x. Solution of permanganate of potassium—*Liquor Potassii Per-*

*manganatis*, is composed of 64 grains of permanganate of potassium to one pint of distilled water. M. de Lacerda has recently discovered that permanganate of potassium is one of the most energetic antidotes to the venom of snakes.

*Dental Uses.* In dental practice the permanganate of potassium is employed in the treatment of fetid and gangrenous ulcerations of the mouth, such as cancrum oris, foul abscesses, ulcerations of mucous membrane attended with fetid discharges; as an antiseptic for decomposing pulps of teeth; in diseases of the antrum and caries and necrosis of the maxillary bones, Riggs' disease, ulcers of the mouth, offensive breath, etc. The powdered crystals introduced into a carious cavity will relieve odontalgia. The stains of permanganate of potassium can be removed by dilute muriatic acid.

DENTAL FORMULÆ.

*For Unhealthy Ulcers of the Mouth, and Offensive Breath.*
(J. W. WHITE).

℞. Potas. Permanganatis...℈ j to iv
Aquæ Destillatæ.....Oj. M.
SIGNA.—To be used as a gargle.

*For Gangrenous Ulceration of the Mouth—Cancrum Oris.*

℞. Potassii Permanganatis..gr. xxx
Aquæ Destillatæ.....℥ j. M.
SIGNA.—Apply as a lotion.

*For Ulcers, Abscesses, Decomposing Pulps of Teeth, etc.*

℞. Liquoris Potassii Permanganatis.....℥ j
Aquæ Destillatæ.....℥ vj to x M.
SIGNA.—To be used as a gargle or as an injection.

*For Fetid Perspiration and Foul Breath.*

℞. Potassii Permanganatis..gr. j
Aquæ Destillatæ .....f ℥ j. M.
SIGNA.—To be used as a lotion and gargle.

## PYRETHRUM—PELLITORY.

*Source.* Pyrethrum is a native of the Mediterranean coast, the root of which is the medicinal portion—*pyrethri radix*, in the form of cylindrical, wrinkled pieces, of the size of the little finger, hard and brittle, and when dried, has little or no odor. Externally it is of an ash-brown color, within white, and possesses an extremely acrid taste, with a burning and tingling sensation over the whole mouth and throat, which continues for some time, and excites a copious flow of saliva.

*Medical Properties and Action.* Pyrethrum root is an irritant

and sialagogue, and when it is rubbed on the skin it causes much irritation, and may even excite inflammation.

Its activity depends upon an acrid oil and a compound resin called *pyrethrin.* It is rarely used internally, and only as a masticatory.

*Therapeutic Uses.* Pyrethrum has been employed as an excitantin paralysis of the tongue and muscles of the throat, relaxed sore throat, spontaneous salivation, certain forms of headache, for such purposes being chewed, or employed in the form of a gargle, in tincture or decoction.

*Dose.* Of Pyrethrum as a masticatory, gr. xx to ℥j. TINCTURA PYRETHRI, TINCTURE OF PYRETHRUM, is composed of pyrethrum ℥iv, rectified spirit Oj.

*Dental Uses.* Pyrethrum is employed in dental practice, for neuralgic affections of the face, for which it is chewed; for the relief of odontalgia, in the form of the tincture applied to the irritable pulp on a pellet of cotton; as a stimulant to the gums and mucous membrane of the mouth in relaxed conditions; for obtunding sensitive dentine, in the form of a strong alcoholic extract. The *ethereal oil of pyrethrum* is recommended as a pleasant and efficacious remedy in odontalgia, applied in the same manner as the tincture; the fluid extract is also employed as an ingredient for local anæsthetic preparations, combined with chloroform, ether and lavender. (See Chloroform.)

DENTAL FORMULA.

*For Relaxed Conditions of Mucous Membrane of Mouth and Gums.*

℞. Tinctura Pyrethri.....f℥ iij
Aquæ.....℥ viij. M.

SIGNA.—To be used as a stimulant gargle.

## QUERCUS ALBA—WHITE OAK.

*Source.* White oak, the dried inner bark of which is the medicinal portion, is a common tree of the natural order *Amentaceæ.* The bark has a light-brown color, fibrous texture and an astringent, bitter taste. Its medicinal virtues depend upon the presence of tannic and gallic acids, and a bitter principle

known as *quercin.* Water and alcohol form with it decoctions and tinctures.

*Medical Properties and Action.* White oak bark is tonic, astringent, and antiperiodic. It is principally used as an external application.

*Therapeutic Uses.* White oak bark is employed internally in the treatment of diarrhœa, dysentery and hemorrhoids. Externally in relaxation of the uvula, tonsils, etc.; gangrene, indolent ulcers, leucorrhœa, atonic menorrhagia, fissure of the anus, etc., etc., in the form of tincture, and decoction as gargles, lotions and injections.

Decoction of White Oak Bark, *Decoctum Quercus Albæ*, is composed of oak bark, ℥j; water, Oj.

*Dose.* Of Powdered White Oak Bark, gr. xxx to gr. xl. Of the decoction the dose is f℥ss to f℥j.

*Dental Uses.* In dental practice the decoction and tincture are employed externally in the various forms of stomatitis, sponginess of the gums, relaxed condition of the mucous membrane of the mouth and fauces.

## QUILLAYA SAPONARIA—QUILLAIA BARK.

### South Am. Soap Tree Bark.

*Source.* Quillaia bark is obtained from an evergreen tree of the natural order *Roseaceæ*—rose order, growing in Chili and Peru, the inner bark being employed.

*Medical Properties and Action.* Quillaia bark when bruised and macerated in water, imparts to that liquid the property of frothing like soap solution when agitated, which is owing to the saponaria in the bark, the same principle which imparts a similar property to soapwort—*saponaria officinalis.* Quillaia contains no tannic acid or other bitter principle, and is an article of commerce, being imported in large quantities for cleansing grease from cloth, as it does not change the color of silken or woolen goods; it is also used for cleansing the hair, which it is supposed to preserve and beautify. When the powder is snuffed up the nostrils, it causes sneezing and a profuse nasal discharge.

*Therapeutic Uses.* Quillaia bark has been employed as a febrifuge, to arrest excessive secretion, as an application to ulcers, as a remedy for colds in the head, when it is used as a sternutatory, in the form of powder.

The tincture is composed of quillaia bark 1 part, alcohol 5 parts; it is also used in the form of infusion and fluid extract.

*Dental Uses.* Quillaia bark, in the form of powder, tincture and fluid extract, is employed as an ingredient of mouth-washes, for its frothy and detergent properties; it is also used as an application to chronic ulcers of the mouth, and to arrest excessive secretion of the mucous membrane of the mouth.

## DENTAL FORMULÆ.

*Detergent Mouth Wash.*
(Am. Journ. Pharm.)

℞. Pulv. Potassii Bicarbonatis..... ℥ss
Mellis..... ℥iv
Alcoholis..... ℥ij
Olei Caryophilli.....q. s
Olei Gaultheriæ,
Quillaiæ Saponariæ (fluid ext.)..... ℥j
Aquæ Destillatæ..... ℥ix. M.

To be used after the removal of salivary calculus.

*For a Mouth Wash.*

℞. Pulv. Quillaiæ Saponariæ..... ℥iv
Glycerini..... ℥iij
Alcoholus dialutus sufficient for 2 pints.
Olei Gaultheriæ.....gtt. xx
Olei Menthæ.....gtt. xx M.

Macerate the soap bark in the mixture of glycerine and alcohol for 3 days, and filter through a little magnesia previously triturated with the volatile oils.

*For Inflamed Gums and Mucous Membrane.*
(Chapin A. Harris.)

℞. Quillaiæ Saponariæ..... ℥viij
Pyrethri,
Radicis Iridis,
Acidi Benzoici,
Cinnamon.....āā..... ℥j
Acidi Tannici..... ℥iv
Sodii Boratis..... ℈iv
Olei Gaultheriæ.....f℥ij
Olei Menthæ.....f℥iv
Cochineal..... ℥iij
Sacchari Albi..... ℔j
Alcoholis..... Oiij
Aquæ puræ..... Ov. M

Digest for 6 days and filter.

Signa.—To be used as a gargle.

## QUININÆ SULPHAS—SULPHATE OF QUININE.

*Formula.* $C_{20}H_{24}N_2O_2$, $3H_2O$.

*Derivation.* The two important alkaloid principles of Cinchona are *quinia* and *cinchonia*, which exist in combination with *kinic* acid. (See Cinchona.)

Sulphate of quinine is obtained by boiling the powdered yellow cinchona bark in water acidulated with hydrochloric acid, by which the alkaloid quinine is separated from kinic and other acids and forms a soluble hydrochlorate or muriate, the salt being decomposed and the quinine precipitated by the addition of lime; sulphuric acid is added, after digestion in boiling alcohol, which dissolves the quinine, and the solution is boiled with animal charcoal, filtered and allowed to crystallize. Sulphate of quinine is in the form of colorless, very light and silky crystals, which are readily soluble in alcohol and in water acidulated with sulphuric acid, but insoluble in ether. It has an intensely bitter taste, and is inodorous.

*Medical Properties and Action.* Sulphate of quinine is a very valuable tonic and antiperiodic, also antiseptic and stimulant. In small doses it increases the fullness of the pulse and action of the heart, and improves the tonicity of the capillary vessels, and is diffused into various parts of the system with great rapidity. In large doses it depresses the action of the heart, lowers the blood-pressure, and enfeebles as well as diminishes the beats of the pulse. As it accumulates in the brain, it causes a fullness in the head, a constricted feeling about the forehead, a buzzing or ringing in the ears—*tinnitus aurium*, giddiness, vertigo, and deafness, which may be permanent if the agent is taken in excessive quantity; also amaurosis and amblyopia may be caused by full doses. Poisonous doses cause intense headache, dilated pupils, delirium, coma and convulsions. Some five hours are required to bring about the greatest effect of quinine, although it can be detected in the urine in about half an hour after it is taken into the stomach, and elimination, chiefly by the kidneys, is not completed in

a less time than 48 hours, although the principal portion is excreted in 12 hours.

*Therapeutic Uses.* Quinine is extensively employed in periodical diseases of a malarial origin, such as intermittent fever, neuralgia of various forms, as enteralgia, hepatalgia, nephralgia, gastralgia, sciatica, angina pectoris, and in cases of debility, pneumonia, pleurisy, endocarditis, pyæmia, erysipelas, puerperal fever, cerebro-spinal meningitis, eruptive fevers, etc., etc.; but the most important uses of quinia are for the treatment of malarial diseases.

*Dose.* Of Sulphate of Quinine, gr. j to ℈j, in aromatic water, by the aid of aromatic sulphuric acid, and also as an enema, or hypodermically. Pills may be made by combining 24 grains of sulphate of quinine with 14 grains of clarified honey, and dividing into 24 pills. Pills can also be made with glycerine.

*Dental Uses.* Sulphate of quinine is internally employed in dental practice in the treatment of facial and other neuralgic affections, in cancrum oris, for its tonic and stimulant effects, in aphthous ulcerations of the mouth and in scurvy, where the system is much debilitated, and externally as an ingredient of dentifrices, for its tonic and stimulant properties.

### QUININÆ HYPOPHOSPHIS—HYPOPHOSPHITE OF QUININE.

*Formula.* $C_{22}H_{24}NO_4PH_2O_2$.

*Derivation.* Hypophosphite of quinine is obtained by dissolving quinine in hypophosphorous acid, or by decomposing sulphate of quinine with hypophosphite of baryta, filtering and evaporating the solution.

*Medical Properties and Action.* Same as those of sulphate of quinine, but not so powerful in its action.

*Therapeutic Uses.* Hypophosphite of quinine is used in all cases where the hypophosphites are indicated, and its action is milder, on account of its containing less acid. It is employed as an antiperiodic, and is especially adapted for the treatment of children during the period of dentition when it is accompanied with emaciation, loss of appetite and strength, and when convulsions are threatened.

*Dose.* Of Hypophosphite of Quinine, gr. j to gr. iij.

DENTAL FORMULÆ.

*For Facial Neuralgia from Dental Disturbance.*

BARRETT.

℞. Ferri et Quin. (cit)..... ℥ ij
Syrup Aurantii..... ℥ j
Aqua Dest..... ℥ j
Elixir Calisayæ..... ℥ ij. M.

SIGNA.—Coch. Parv. ter in die.

*For Neuralgia from Dental Disturbance.*

L. DE L. GORGAS.

℞. Quininæ Sulphatis.....gr. x
Ferri Sulphat. Exsic....gr. v
Acidi Arseniosi.....gr. ss
Ext. Nucis Vomicæ.....gr. v. M. ft. pil. No. xx.

SIGNA.—One pill every four hours.

*For Neuralgia Associated with Anæmia.*

GARRETSON.

℞. Tinct. Ferri Chloridi.... ℥ j
Quininæ Sulphatis..... ℥ j. M.

SIGNA.—Teaspoonful four times daily.

## RHIGOLENE—RHIGOLENE.

*Derivation.* Rhigolene is a product of the distillation of petroleum. In its composition it is a hydro-carbon, and is destitute of oxygen, being extremely volatile and inflammable, and is the lightest of all liquids, with a specific gravity of 0.625. It is a petroleum naphtha, and boils at 70° F., and when perfectly pure should be almost odorless; but it is difficult to procure any specimen that does not have the unpleasant odor of petroleum. It is colorless, and on account of its great volatility and inflammability requires to be kept tightly stopped, in a cool place. The storage of large quantities, except in very secure places, is attended with considerable risk, and on this account it is somewhat difficult to procure it outside of the manufactories. It is dangerous to use it at night, or near a light.

*Dental Uses.* Rhigolene is employed, like absolute ether, to produce local anæsthesia, by dispersing it in the form of spray, with the spray apparatus, being the most rapid in its congealing effects, and also the most easily controlled and convenient of all of the freezing mixtures. As a local anæsthetic it is employed in the operation of extracting teeth, by applying it, in the form of spray, to the parts about the tooth to be removed until a blanched surface of gum is produced. The

spray of rhigolene is also applied to the gum over the root of a tooth affected with incipient periostitis.

## SANDARACA—SANDARACH.

*Source.* Sandarach is a resinous substance obtained from an evergreen tree—*Thuya Articulata*—which grows in the northern part of Africa. The gum is in the form of small, irregular, round and oblong tears, of a pale yellow color, sometimes brown, and more or less transparent, dry and brittle. It has a faint, agreeable odor, which is increased by warmth, and a resinous, somewhat acrid taste. It melts with heat, diffusing a strong balsam odor, and is inflammable. It is soluble in alcohol and ether, and slowly dissolves in warm oil of turpentine. It consists of three resins, varying in their relations to alcohol, ether, and oil of turpentine. The *sandaracin* which remains after sandarach has been exposed to the action of ordinary alcohol is a mixture of two of these resins.

*Uses.* Sandarach was formerly employed as a medicinal agent, and entered into the composition of various ointments and plasters, but its use is now restricted to such purposes as the composition of a varnish, ingredient of incense, etc. After the erasion of ink marks, its powder, if rubbed on such a surface, will prevent fresh ink marks from spreading.

*Dental Uses.* In dental practice, sandarach dissolved in alcohol forms a varnish for coating the surface of plaster models, etc.; it is also used for checking secretions from the gums during the operation of filling teeth, either applied as a coating to the surface, or on bibulous paper saturated with it. It is also employed to saturate cotton to be used as a temporary filling in cavities of the teeth, for the protection of medicinal applications.

DENTAL FORMULA.

*Transparent Sandarach Varnish.*

℞. Gum Sandarach..... ℥v
Alcohol .....qt. j.
Mix and digest over a moderate heat until the sandarach is dissolved.

## SHELL-LAC—SHELLAC.

*Source.* Lac is a resinous substance, obtained from several varieties of trees which grow in the East Indies, and particularly from the *Croton Lacciferum*, and two species of the *Ficus*. It is supposed to be an exudation from the bark, owing to the puncture of an insect belonging to the genus *Coccus;* it is also said to be the exudation from the bodies of the insects themselves. Several varieties are known in commerce, the most common being the *stick-lac*, the *seed-lac* and the *shell-lac*. Lac, in its crude state, consists of resin, coloring matter, and a peculiar principle, insoluble in water, alcohol or ether, and known as *lacin*, a little wax, and various saline matters in small proportion.

*Uses.* It is slightly astringent, and has been recommended as an adhesive substance for dressing ulcers, wounds, etc., being used by simply spreading it on the bandages after it is dissolved in alcohol by a gentle heat. Shellac is prepared by melting the crude lac, straining it, and pouring it upon a flat, smooth surface, to harden. It is in the form of thin fragments of various sizes, from half a line to a line in thickness, and of a light and also dark brown color, shining, hard, brittle and inodorous. It is insoluble in water, but freely soluble in alcohol, especially with the aid of heat. It is employed as a varnish. In dental practice its uses are the same as those of sandarach, but, owing to the dark brown color of the solution, it is not so sightly, and does not make a transparent varnish.

### DENTAL FORMULA.

*For a Colored Varnish.*

℞. Gum Shellac.....℥ v
Alcohol.....qt. j.
Mix and digest over a moderate heat until thoroughly dissolved.

## SODÆ PHENAS—PHENATE OF SODIUM.

### Carbolate of Sodium.

*Formula.* $NaC_6H_5O$.

*Derivation.* Phenate or carbolate of soda is obtained by mixing caustic soda with carbolic acid and a small quantity of water, and evaporating the solution, the result being a saponaceous mass of acicular crystals of a light pinkish color, which are converted by heat into a fluid of an oily consistence. It is freely soluble in creasote, carbolic acid and water.

*Medical Properties and Action.* Phenate of soda is hæmostatic, antiseptic and disinfectant.

*Therapeutic Uses.* It is internally administered in the form known by the French name of *Phenol Sodique*, in doses of gtt. viij or gtt. x in a glass of water in typhus and typhoid fevers, as a preventive of cholera, in plagues, cholera infantum, etc.; externally it is a valuable styptic in local hemorrhage, and as a dressing for wounds, burns, chilblains, excoriations, varicose veins, venomous stings and bites, and as a disinfectant in throat affections, leucorrhœa, diphtheria, scarlatina, smallpox, ozæna, etc.

*Dental Uses.* Phenate of soda is useful in dental practice, as an astringent and styptic in hemorrhage following the extraction of teeth, and to relieve the soreness of such an operation, as it promotes the rapid absorption of the extravasated blood, and the healing and hardening of the gums. It is applied on a pellet of cotton, or in solution with water, and acts as a sedative and antiphlogistic as well as a hæmostatic, and has little or no escharotic action. For soft and spongy gums it forms an efficient gargle or mouth wash, and can be employed for this purpose in its full strength, in the form of phenol sodique, or diluted with from one to twelve parts of water. When applied on cotton, to an exposed and inflamed pulp, it relieves odontalgia. It is also employed in aphthous ulcerations of the mouth, and as a disinfectant in offensive breath, in the proportion of a teaspoonful to a glass of water.

DENTAL FORMULA.

*A Phenol Sodique Preparation.*

℞. Acidi Carbolici.....grs. clxxxviij
Sodæ Caustic.....grs. xxxj
Aquæ.....℥iv. M.

SIGNA.—To be applied on a pellet of cotton, or, as a mouth wash, diluted to meet requirements of case.

## SODII BICARBONAS—BICARBONATE OF SODIUM.

(SESQUICARBONATE OF SODIUM.)

*Formula.* $NaHCO_3$.

*Derivation.* Bicarbonate of sodium is obtained by saturating the carbonate of sodium with carbonic acid. It is in the form of a white, opaque powder, freely soluble in water, with a mild, slightly alkaline taste.

*Medical Properties and Action.* Bicarbonate of sodium is antacid, alterative and lithontriptic, and from its mildness and non-irritating qualities is more pleasant to the taste and to the stomach than the carbonate. It is extensively used in the preparation of soda and seidlitz powders.

*Therapeutic Uses.* Bicarbonate of sodium is internally administered in neuralgia connected with acidity of the stomach, cardialgia, flatulence and vomiting, dyspepsia, diarrhœa, diseases of the skin, albuminuria, calculous disease, etc. Externally in diseases of the skin of a scaly and papular nature, ecthyma, ringworm, and sprinkled over burns and scalds, and combined with an equal part of common salt, for stings of venomous insects.

*Dose.* Of Bicarbonate of Sodium, gr. v to ʒj, in carbonic acid water, or with sugar and mucilage.

EFFERVESCING POWDERS—*Pulveris Effervescentes*, are composed of tartaric acid, gr. xxv in one paper, and bicarbonate of sodium, gr. xxx in another paper.

*Dental Uses.* Bicarbonate of sodium is employed in dental practice, to relieve neuralgia of an acid origin, in which a full dose often proves very serviceable; in aphthæ of children it is often combined with a little rhubarb and proves very efficacious.

Externally it relieves odontalgia when a small portion of the powder is applied to the irritable pulp. It is also useful for neutralizing the acidity of the oral fluids, especially when such a condition is the result of pregnancy. It also forms an antacid ingredient in dentifrices.

## SODII BORAS—BORATE OF SODIUM.

### (Borax.)

*Formula.* $2NaBO_2$, $2HBO_2$, $9H_2O$.

*Source.* Borax is a native salt, but can be obtained artificially by boiling together native boracic acid (found in Italy), and carbonate of soda. California furnishes the borax used in this country. It is in the form of colorless crystals, which effloresce somewhat in dry air, and are freely soluble in water and glycerine, but insoluble in alcohol, with an alkaline reaction, and a sweetish, alkaline taste. It dissolves fibrine, albumen, casein and uric acid.

*Medical Properties and Action.* Borax is refrigerant, diuretic, detergent, antacid and emmenagogue, and has been employed as a solvent for calculi. It resembles in its action carbonate of soda, and by its mild alkaline qualities it improves the condition of the skin and mucous membranes. In excessive or large repeated doses it is injurious, causing nausea and vomiting, and a scorbutic condition of the body.

*Therapeutic Uses.* Borax is internally administered in infantile diarrhœa, in the form of an enema; also as a solvent for calculi, and in dropsy, etc., but its chief use is as an external application. Externally it is applied as a detergent in cutaneous affections, ulcerations, pityriasis, to remove freckles, to allay itching, etc., etc.

*Dose.* Of Borate of Sodium, gr. ij to ℈j.

Glycerite of Borate of Sodium—*Glyceritum Sodii Boratis*—Glycerinum Boracis—is composed of borax, ℥ij; glycerine, Oss, and is a useful application to the mouth and throat.

Honey of Borate of Sodium—*Mel Sodii Boratis—Mel Boracis*—is composed of borax, ℥j; clarified honey, ℥j, and

is also useful as a detergent application to the mouth and throat.

*Dental Uses.* Borax, mixed with sugar or honey, is a very useful application for aphthæ and other ulcerations of the mouth, for which it may be mixed with sugar in the proportion of one part to seven, or in the form of *mel boracis.* In mercurial stomatitis, an aqueous solution of borax, or the *mel boracis*, forms an efficient gargle. Borax is also a useful application in fissured or cracked tongue. Borax is also added to sage and balm teas, to form gargles.

In the dental laboratory, borax is employed as a flux in melting metals, such as gold and silver, and in the process of soldering metals. It is also employed to harden plaster casts or models, the model being well dried and then immersed for a few minutes in a solution of borax in boiling water, which renders it, when cool, hard and durable. (Solutions of carbonate of soda and alum are used for the same purpose.)

## DENTAL FORMULÆ.

*A Mild Detergent Gargle.*

℞. Sodii Biboratis.....ʒ j
Glycerini.....ʒ vj M.

*For Fissured or Cracked Tongue.*

℞. Sodii Biboratis.....ℨ j
Glycerini.....ʒ j. M.
To be used as a lotion or gargle.

*For Aphthous Ulcerations, Parasitic Formations, and Diphtheritic Conditions.*

℞. Sodii Hyposulphitis.....ʒ ij
Syrupi Auranti.....ʒ iv
Aquæ Destillatæ.....ʒ iv. M.
SIGNA.—To be applied as a lotion or mouth wash, stimulant and antiseptic.

*For Fissured Tongue.*
(J. W. WHITE.)

℞. Sodii Biboratis.....gr. xl
Glycerini.....ʒ j
Aquæ Destillatæ.....ʒ iv. M.
To be used as a gargle.

*A Detergent Alkaline Gargle.*

℞. Sodii Biboratis.....ʒ iv
Glycerini,
Tincturæ Myrrhæ...āā..ʒ ss
Aquæ Destillatæ.....ʒ x. M.

*For Aphthous Ulcerations, etc., etc.*

℞. Sodii Sulphitis.....ʒ j
Glycerini.....ʒ j. M.
SIGNA.—To be used as a lotion or mouth wash.

## TERCHLORIDE OF PHENOL.

*Derivation.* Terchloride of phenol has recently been introduced as a disinfectant and antiseptic. It is prepared by passing a stream of chlorine gas through chemically pure carbolic acid, previously melted, until it acquires a violet hue.

*Medical Properties and Action.* It is not an irritant and has no acid reaction. When carbolic acid is acted upon by chlorine gas a number of compounds are produced; such as a monochloride, a bichloride, and a tri- or ter-chloride of carbolic acid (phenol).

*Therapeutic and Dental Uses.* Terchloride of phenol is claimed to be a valuable antiseptic and disinfectant in the treatment of gangrenous ulcers, etc. In dental practice it has been very recently recommended in combination with iodoform, as a material for capping exposed pulps and as a filling for root canals of teeth, and the advantages claimed for it are, that it will be resorbed when in contact with living tissues; it is easily introduced into pulp canals; it absorbs exudations; it becomes hard when mixed with certain chemical substances, but is destroyed by pus; it is a very bad conductor of heat; and it is absolutely a non-irritant. The method recommended for its use as a capping and filling material, is to incorporate the iodoform and terchloride of phenol with decalcified dead bone, as follows: dead bone or ivory shavings are decalcified in a ten per cent. solution of chemically pure hydrochloric acid, and after all the lime salts are extracted, the residue is collected upon a filter, washed, dried and rubbed to a fine powder in a porcelain or glass mortar. Upon this powder ten times its weight of a ten per cent. solution of iodoform in sulphuric ether is gradually poured and constantly rubbed until a fine yellow powder is obtained, which contains about fifty per cent. of iodoform. When used as a capping for pulps, or a filling material for root canals of teeth, this powder is made into a paste by the addition of carbolic acid or terchloride of phenol, being worked or rubbed together like ordinary cement. For hyperæmic conditions of the dental

pulp success has attended the application of a cap of the iodoform and decalcified bone paste mixed with terchloride of phenol. For inflamed pulps the application of terchloride of phenol is to be repeated every third or fifth day, until no more pain is felt, and the pulp is then to be capped with the decalcified bone, iodoform and terchloride of phenol material, and a temporary filling introduced into the crown cavity. The treatment of ulcerated and gangrenous pulps of teeth consists in treating with the terchloride of phenol, and after the second or third application, if no trouble occurs from a temporary closure of the root canals, to fill with the decalcified bone, iodoform and terchloride material, using whalebone instruments for its introduction, until congelation is occasioned, and the congested condition of the capillaries of the part relieved, acting as a counter-irritant and antiphlogistic.

## THYMOL—THYMOL.

*Formula.* $C_{10}H_{14}O$.

*Derivation.* Thymol, or thymic acid, is obtained from the herb thymus vulgaris, or common thyme, which is cultivated in this country for the same purpose as sage, lavender, etc. Thyme yields a volatile oil, *oleum thymi*, from which thymol or thymic acid is obtained by treating the oil with an aqueous solution of potassa or soda, which separates it from a principle called *thymene*, with which it is mixed in the oil, and which is not affected by the alkalies. The thymate thus formed is decomposed by an acid, and the liberated thymol or thymic acid is purified by repeated washings, dessication and distillation. Thymol is in the form of aromatic white crystals, soluble in one thousand parts of hot water.

*Medical Properties and Action.* In a concentrated state, thymol has an acrid and caustic taste, but when very much diluted, the only taste experienced is that of thyme.

Thymol has acid properties, and is similar in its action to carbolic acid. It imparts a sense of coolness to the mouth, like that of oil of peppermint, and when once melted it remains indefinitely in the liquid state.

While it is only slightly soluble in water, it is freely soluble in alcohol, and is dissolved by ether and the fixed oils. The alkalies unite with it to form soluble salts. Like creasote, it has the property of combining with animal tissues, and thus prevents putrefaction. While it has the important practical properties of carbolic acid, it is free from disagreeable odor, and it is claimed to be as efficient an antiseptic as that agent.

*Therapeutic Uses.* Thymol is almost exclusively employed as an external application, and is often substituted for the oil of origanum, which is obtained from the common majoram. It is considered to be a valuable antiseptic and antifermentative agent.

*Dental Uses.* Thymol, when combined with glycerine, in a form known as *Glycerole of Thymol*, is a valuable antiseptic in the treatment of suppurating pulps of teeth, as a dressing for ulcers of the mouth, wounds, etc.; also in the treatment of teeth after the devitalization of the pulp, chronic inflammation of the pulp, and alveolar abscess, as it arrests the putrefactive process; also in stomatitis and abrasion of mucous membrane.

DENTAL FORMULÆ.

*Glycerole of Thymol.*

℞. Thymolis (cryst.).....gr. xx
Glycerini,
Alcoholis.....āā .....f℥ j
Aquæ Destillatæ.....Oj. M.

*For Alveolar Abscess, Suppurating Pulps, etc.*
(ALVIN.)

℞. Thymolis (cryst.).....ptm. j
Iodi .....ptm. j
Potassii Iodidi.....ptm. j
Glycerini .....pts. v to xv
Apply as in use of carbolic acid.

*For Stomatitis.*
(ALVIN.)

℞. Thymolis (cryst.).....ptm. j
Glycerini .....pts. 100.
SIGNA.—To be used as a lotion and gargle.

*For an Antiseptic in Suppurating Pulps, Alveolar Abscess, etc.*

℞. Thymolis (cryst.).....ptm. 1
Glycerini .....pts. ij to iv.
SIGNA.—Applied in same manner as carbolic acid.

## VASELIN—VASELINE.

### Petroleum Ointment.

*Derivation.* Vaseline is obtained from crude petroleum, in the form of a petroleum jelly. In the distillation of crude petroleum there remains in the apparatus, after the separation of the light oils, a semi-liquid tar, which constitutes crude vaseline, which, in such a state, has a disagreeable odor like petroleum, of a strong taste and black color. This compound is heated in the open air, and decolorized by animal charcoal, the product being the petroleum jelly known as vaseline, which is a mixture of several hydrocarbons.

When pure, vaseline is white, inodorous and insipid, and of the consistence of jelly, or very unctuous fat. It melts at 35° C., boils at 150° C., and distills at 200° C., and burns without residue. Exposed for a considerable time to light, it acquires a slight odor of petroleum. It is insoluble in water, sparingly soluble in alcohol, and very soluble in warm ether, chloroform, fats, volatile oils, and sulphide of carbon. It sensibly dissolves iodine, bromine, sulphur, phosphorus, carbolic acid, benzoic acid, atropine and strychnine.

*Medical Properties and Action.* By its composition, vaseline is not capable of becoming rancid, nor of being saponified; hence it is a very useful agent or excipient for caustic alkalies, oxides, metallic salts, and even acids in the cold, without action by them, and without modifying their therapeutic properties. Incorporated in ointments, a certain quantity of vaseline will preserve them and obviate rancidity, being preferable to lard, butter, glycerine and glyceroles. The addition of paraffin will give it any consistence desired.

*Therapeutic Uses.* Vaseline is used externally as a dressing for wounds, cuts, bruises, sprains, piles, rheumatism, skin diseases, eczema, inflamed surfaces, diseases of the eye, etc., etc. Combined with carbolic acid, it forms a very useful ointment for affections of the skin, etc., etc.

*Dental Uses.* Vaseline is an efficacious application to inflamed and excoriated surfaces of the gums and mucous mem-

brane of the mouth; also as a dressing introduced into the canals of teeth affected with periostitis, and as an emollient application after the devitalization and removal of dental pulps.

In the form of *Vaseline Camphor Ice*, it is a pleasant and efficacious application to chapped lips and hands, being bland and non-irritating in its action.

An ointment made by dissolving and incorporating thoroughly by the aid of heat, equal parts of vaseline and lead plaster, to which a little bergamot may be added for perfume, is very serviceable for the treatment of excoriated surfaces, and dry desquamating surfaces of certain skin diseases, and especially to the form of skin affection which may result from the constant use of scented soaps on the hands.

## VERATRINA—VERATRINE.

*Source.* Veratrine is an alkaloid, or a mixture of alkaloids obtained from the seeds of *asagræa officinalis*, of the natural order *Melanthaceæ*. It is in the form of a white, or grayish-white amorphous powder, of an acrid taste, imparting a sensation of tingling and numbness to the tongue, and causing constriction of the fauces and violent sneezing. It is but slightly soluble in cold or hot water, to which it imparts an acrid taste and a somewhat alkaline reaction.

It is soluble in three parts of alcohol at 59° F., and very soluble in boiling alcohol; also soluble in 6 parts of ether, in 2 parts of chloroform, and in 96 parts of glycerin; it melts when heated.

Veratrine Ointment—*Unguentum Veratrinæ*—is composed of veratrine, 4 parts; alcohol, 6 parts; benzoinated lard, 96 parts. The veratrine is rubbed with the alcohol in a warm mortar until dissolved, and the benzoinated lard gradually added and thoroughly mixed.

*Therapeutic Uses.* Veratrine is used only externally in neuralgia, myalgia, headache, rheumatism, paralysis, etc., in the form of the ointment, or dissolved in alcohol.

*Dental Use.* Veratrine, in the form of the ointment, is used for facial and other forms of neuralgia, a small quantity being rubbed over the seat of pain.

## VERATRUM VIRIDE—AMERICAN HELLEBORE.

### (Poke Root.)

*Source.* Veratrum viride, of the natural order *Melanthaceæ*, the officinal portion of which is the root, is indigenous to the swampy portions of the United States, and is prepared in the form of slices or fragments, of a dark or blackish-gray color externally, and of a grayish-white color internally. Its odor is peculiar, especially when it is moistened, and its taste is bitter and acrid. It is inodorous, but in the form of powder is sternutatory. It is similar in chemical composition to veratrum album—white hellebore, and veratrum sabadillæ. Like veratrum album, it contains a quantity of soft resin, and two alkaloids—*jervia* and *veratroidia*.

*Medical Properties and Action.* Veratrum viride is acrid and sedative, causing redness and heat when applied to the skin, and has a violent sternutatory effect on the Schneiderian membrane. Small doses stimulate the secretions and depress the pulse. Although a prompt emetic, its operation is attended with intense nausea and depression, and violent, persistent vomiting. Large doses occasion great depression, with a weak action of the heart and pulse, vomiting, retching, cold surface of body, a cold perspiration, faintness, dimness of sight, dilatation of the pupils, great muscular weakness, slow respiration, and sometimes coma, insensibility and stertorous breathing, but notwithstanding such symptoms, fatal results are rare. The antidotes are free stimulants. The tincture—*Tinctura Veratri Viridis*, is the best preparation for internal administration.

*Therapeutic Uses.* Veratrum viride is not employed for its emetic effect, on account of its violent action. Internally it is administered in diseases of the heart, active hemorrhage in the plethoric, to reduce the temperature and pulse in "typhoid

and other fevers," in acute mania and delirium, in puerperal convulsions, neuralgia, neuralgic headache, etc., etc. Externally it is employed for neuralgia, myalgia, headache, rheumatism, paralysis, etc., etc.

*Dose.* Of the Tincture of Veratrum Viride, ♏ij to ♏v, of the Fluid Extract of Veratrum Viride—*Extractum Veratri Viridis Fluidum*, ♏ij to ♏v.

*Dental Uses.* In dental practice the tincture of veratrum viride has been employed internally for neuralgia of the fifth nerve; also in dental periostitis, as a sedative; also in severe hemorrhage from the extraction of teeth, to depress the heart's action.

DENTAL FORMULA.

*For Facial Neuralgia.*

DA COSTA.

℞. Veratriæ.....gr. xv
Aconitiæ.....gr. ij
Glycerinæ.....f℥ij
Cerati adipis.....f℥vj. M.

SIGNA.—To be rubbed over painful part, care being taken to see that there is no abrasion of the skin.

## XANTHOXYLUM—PRICKLY ASH.

*Source.* Xanthoxylum is a shrub growing in the Northern, Middle and Western States of North America. The bark is the officinal portion, and is obtained in the form of pieces, more or less quilled, of one or two lines in thickness and of a whitish color, with an ash-colored epidermis. It is quite inodorous and has a taste at first sweetish and slightly aromatic and afterwards bitter and acrid.

*Medical Properties and Action.* Xanthoxylum is aromatic, stimulant, and sialagogue, and when swallowed occasions a sense of heat in the stomach, more or less general arterial excitement, and a tendency to diaphoresis.

*Therapeutic Uses.* Xanthoxylum has been administered with considerable benefit in the chronic form of rheumatism.

*Dose.* Of Powdered Xanthoxylum, gr. x to ℥ss, three or four times a day.

*Dental Uses.* Xanthoxylum, in the form of the powder, has been applied with success to an aching pulp for the relief of odontalgia, and a decoction of the bark is employed as a wash for foul ulcers; in the form of a tincture it is efficacious in relieving the soreness which remains after the extirpation of the dental pulp; it is applied on floss silk or cotton. In the Southern States the Angelica Tree—*Aralia Spinosa*, sometimes called 'Toothache Tree,' is often called prickly-ash, but it differs from Xanthoxylum, although its tincture answers for the relief of odontalgia.

## ZINCI CHLORIDUM—CHLORIDE OF ZINC.

*Formula.* $ZnCl_2$.

*Derivation.* Chloride of zinc is obtained by the action of hydrochloric acid on granulated zinc, the solution thus made being purified by a solution of chlorine and carbonate of zinc, when it is evaporated till it assumes a solid form. It is in the form of a white deliquescent salt, freely soluble in water, alcohol and ether, as soft as wax, and capable of being melted and sublimed by heat As it rapidly deliquesces when exposed to the air, it should be kept in glass-stoppered bottles. It has a styptic, metallic taste, which is very disagreeable.

*Medical Properties and Action.* Chloride of zinc is the most active of the zinc preparations, being a powerful and penetrating escharotic. Its local action as a caustic depends upon its affinity for albumen and gelatin, and when in contact with living parts it destroys their vitality, and uniting with the albuminous and gelatinous matters present, forms an eschar. It is also a useful deodorizer and disinfectant, and largely diluted has been employed as a nervine tonic; but as the milder preparations of zinc answer the same purpose, it is rarely employed internally. On account of the great affinity for water and its power of combination with albumen, chloride of zinc penetrates and spreads deeply, and produces an eschar which is white, thick and hard. When applied to malignant and indolent ulcers, it promotes healthy granulations, and when topically applied it not only destroys the diseased structure,

but excites a new and healthy action in the surrounding parts. When employed as a caustic, it does not give rise to constitutional disorder from absorption, an effect which is sometimes caused by arsenical preparations. In over doses it causes a burning pain in the throat and stomach, nausea, vomiting, cold sweats, decrease of pulse, cramps of the limbs, etc., being a powerful irritant poison. The antidotes in poisoning by zinc salts are albumen, carbonate of soda, magnesia and soap.

*Therapeutic Uses.* Chloride of zinc has been employed internally in chorea, epilepsy, neuralgia, scrofula, and combined with hydrocyanic acid in facial neuralgia. Externally it is applied to malignant growths, gonorrhœa, indolent ulcers, etc. A solution of the chloride of zinc is used as an antiseptic and disinfectant.

Liquor Zinci Chloridi—*Solution of Chloride of Zinc*, known as "Burnett's Disinfecting Fluid," is composed of Chloride of Zinc, gr. cc, water, ℥j.

*Dose.* Of Chloride of Zinc, gr. ss, or gr. j, or gr. ij, largely diluted.

*Dental Uses.* Chloride of zinc is a valuable agent in dental practice, being employed as an external application to sensitive dentine. As an obtunding agent a drop of the deliquescent chloride is placed in contact with the sensitive dentinal surface (which has previously been dried and is protected from all moisture), and allowed to remain for from two to four minutes. Considerable pain follows the application of the chloride, which is of a steady, continuous character, without the throbbing nature which characterizes the pain of an irritated dental pulp. Its painful action may be modified by bathing the sensitive surface, prior to the application of the chloride, with chloroform, tincture of aconite or atropine solution, or a combination made. When the pain has subsided the excavation of the cavity can be proceeded with until the layer of dentine affected by the chloride has been removed, when another application may be necessary. As it is not absorbed by the dentine to any great degree, its action being superficial, it is not so

dangerous an agent as is arsenious acid when employed for the same purpose.

In no case should the chloride of zinc be used as an obtunding agent, when there is danger of irritating the pulp of the tooth.

Applied to dentine its superficial action is owing to its soon becoming decomposed. Chloride of zinc is also employed to arrest superficial hemorrhage from a wound of the gum during the filling of teeth; it will also temporarily arrest the secretion of mucus from the surface of the mucous membrane of the mouth. When applied to a cut surface it induces union by first intention, by its effect upon the glutinous matter.

It has also been successfully employed as an injection for chronic alveolar abscesses, and in the treatment of ulceration of the gums attended with recession of gum and absorption of process from the necks of teeth; also as an injection in disease of the antrum. It has been claimed that its application in a diluted form will promote the formation of secondary dentine over a nearly exposed pulp, but its escharotic action must be considered in using the agent for such a purpose. When applied to the sulcus which often forms during ulceration and recession of the gum from the neck of a tooth, the application can be safely and conveniently made by means of a camel's-hair brush, or by a piece of orange wood so shaped as to permit of its being introduced to the bottom of such a sulcus. Chloride of zinc in a properly diluted form is an efficient disinfectant, and has been employed for such a purpose in gangrenous conditions of the mouth.

Chloride of zinc is one of the ingredients of the temporary filling material composed of the chloride of zinc in solution and the oxide of zinc, which has been employed to cap the exposed pulps of teeth. But owing to the escharotic action of the chloride this method has not been uniformly successful. The zinc preparations, however, answer good purposes as temporary filling materials, especially in sensitive cavities where the presence of metallic fillings would not be tolerated. (See Appendix to Dental Formulary.)

## ZINCI OXIDUM—OXIDE OF ZINC.

*Formula,* ZnO.

*Derivation.* Oxide of zinc is obtained by subjecting precipitated carbonate of zinc to a red heat, till the whole of the carbonic acid and water are expelled.

It is in the form of a yellowish-white powder, insoluble in water, but soluble in dilute sulphuric and hydrochloric acids, without effervescence. It is inodorous and tasteless.

*Medical Properties and Action.* Oxide of zinc is tonic and antispasmodic, but in large doses causes vomiting and purging; by gradually increasing the dose, large quantities can be taken without injurious effects. It should never be given on an empty stomach, as it may cause nausea.

*Therapeutic Uses.* It is employed in spasmodic asthma, convulsions of children, epilepsy, chorea, hooping cough, hysteria, and is an excellent remedy for gastralgia; also in chronic diarrhœa and chronic dysentery.

*Dose.* Of Oxide of Zinc, gr. ss to gr. x.

*Dental Uses.* Oxide of zinc may be employed in the treatment of convulsions of children during dentition, given in doses of gr. ss to gr. v, gradually increased to gr. viij, in powder, with a little sugar. It is also combined with carbolic acid, in a fluid form, for capping exposed pulps, being applied in the form of a paste to the exposed surface of the dental pulp. It also forms an ingredient of the zinc-filling materials, and of the celluloid base for artificial teeth. (See Appendix to Dental Formulary.)

## ZINCI SULPHAS—SULPHATE OF ZINC.

*Formula.* $ZnSO_4\ 7H_2O$.

*Derivation.* Sulphate of zinc is obtained by the action of sulphuric acid on granulated zinc, the solution being purified by means of chlorine and carbonate of zinc, and afterwards evaporated, the product being crystals of sulphate of zinc. It is in the form of colorless crystals, which effloresce on exposure to air, and are soluble in water and insoluble in alcohol,

resembling in appearance Epsom salts. It has a disagreeable, metallic, styptic taste.

*Medical Properties and Action.* Sulphate of zinc is tonic, astringent, antispasmodic, and, in large doses, emetic. Externally, it is stimulant and astringent. When its use is long continued, it produces symptoms like those of lead. When administered in proper doses, it exerts an antispasmodic influence on the nervous system, and where there is spasm and convulsion, it is very serviceable.

*Therapeutic Uses.* It is internally administered in epilepsy, chorea, hysteria, angina pectoris, chronic dysentery, flatulence, night sweats of phthisis, etc., and is a prompt emetic in cases of narcotic poisoning. Externally, it is employed in the treatment of gonorrhœa, diseases of the eye, chronic skin diseases, epithelioma, ulcers, gangrene, etc.

*Dose.* Of Sulphate of Zinc, gr. ¼ to gr. vj. For an emetic in cases of poisoning six grains will prove sufficient, well diluted with water, and repeated every fifteen minutes until emesis occurs.

*Dental Uses.* Sulphate of zinc is employed externally in dental practice, in gangrene of the mouth, disease of the antrum, ulcerations of mucous membrane, and indolent ulcers, acting as a stimulant and astringent.

## DENTAL FORMULÆ.

*For Gangrene of the Mouth, (Cancrum Oris).*

℞. Zinci Sulphat.. .....gr. xx
Mellis..... ..... ℥j. M.
SIGNA.—To be applied with a camel's hair brush.

*For Ulceration of Mucous Membrane of the Mouth.*

℞. Zinci Sulphat.....gr. j to v
Aquæ Destillatæ.... ℥j. M.
SIGNA.—To be used as a gargle or lotion.

*For Chronic Alveolar Abscesses, Abscess of Antrum, etc.*

G. L. PARMELE.

℞. Zinci Sulphat.....gr. iij
Plumbi Acetatis.....gr. v
Tinct. Catechu.....gtt. x
Aquæ.....f℥j. M.
SIGNA.—Use as a stimulating injection.

## TOPICAL REMEDIES.

Medicinal substances are applied to the mucous membrane of the mouth, and to the dental structures, almost exclusively for local effects. In dental practice antiseptic remedies are extensively employed to arrest fermentative and putrefactive processes, as every kind of fermentation depends upon the growth and increase of a living organism. Various diseases of the dental structures have a close relationship with low organisms, in the morbid processes which result during their progress, and which are maintained and developed by the presence of living matter. The remedies recognized as belonging to the group of antiseptics, when brought into contact with the disease germs, which are constituted of these organized forms of life, have the power of destroying their vitality and of arresting the fermentative or putrefactive process which they either develop or promote. The effect of escharotics when applied to a part of which the structure and vitality are to be destroyed, is to produce an eschar, and incite inflammation and suppuration of the adjacent tissues, by which the slough is separated from the living parts.

Medicinal substances are applied to the mucous membrane of the mouth in the form of gargles or mouth washes, lotions and injections, and generally for a local effect.

Medicinal substances are applied to the skin for both a local and general effect, either by friction, by the endermic, or by the hypodermic methods. In the *endermic method* the cuticle is usually removed by the action of a blister and the medicinal agent is applied to the denuded surface in the form of a powder or ointment, and is a useful method when the irritability of the stomach or difficult deglutition prevents medicines from being taken through the mouth.

The *hypodermic method* consists in injecting medicines by means of a graduated syringe with a sharp-pointed nozzle, and constructed for the purpose, into the subcutaneous cellular tissue, thus producing both a local and general effect, and an impression is made much more rapidly than when the medicine

is taken into the stomach. The medicinal agents used for hypodermic injections are so prepared as to be perfectly soluble, and of considerable strength in small bulk. Anodynes thus used are more rapid in their effect, and the general rule as regards the quantity is, that in first injections the dose should be, for males, two-thirds of the ordinary dose by the stomach, and for females, about one-half. It is very necessary that a vein should not be punctured when introducing the point of the syringe. The insertion of the deltoid muscle in the arm is generally selected as the place for injection, and the needle-point of the syringe should not be inserted very deep, nor at the same point in subsequent injections.

Medicinal substances of the classes of rubefacients and epispastics are employed as *counter-irritants*, their effect being to establish external or artificial irritation for the relief or cure of internal inflammation existing in a part or in the body. The extent and character of the counter-irritation thus established should be in a great measure regulated by the character of the disease which it is intended to relieve; a rubefacient being indicated in irritation of mucous membrane, a seton or issue when the disease is of a suppurative character, and a vesicant in inflammation of serous membranes.

*Setons and Issues* are employed to produce permanent counter-irritant effects. A seton consists of a skein of silk or a piece of tape or other substance passed through the integument by means of a seton-needle, and allowed to remain so that a discharge is maintained. A simple seton in the case of an incision into an alveolar abscess, is composed of a single or double strand of floss silk introduced into a wound made by the lancet, or into the orifice of a fistulous opening, after the pus of the abscess has been evacuated, to maintain a free exit for the pus which may be secreted after the first operation; fine silver wire is also employed for the same purpose. An issue is generally some irritating substance, such as caustic potassa, or a small pea, or piece of orris root, introduced to maintain a discharge.

*Bloodletting* is performed for the purpose of lessening vascu-

lar excitement, reducing inflammatory action, relieving congestive pain and spasm, promoting absorption, relaxing the muscles and arresting hemorrhage. It is divided into *general* and *local*, general bloodletting consisting of venesection or phlebotomy, the median cephalic or basilic veins of the arm, and occasionally the external jugular and other veins, being the ones selected from which to draw the blood. But it should be resorted to with caution, as it is a powerful and exhausting agent.

*Local Bloodletting* is chiefly employed for the relief of local inflammations and congestions, and is accomplished by means of leeches, cups, and scarifications.

The leech—*hirudo*—is commonly employed as an agent for local bloodletting, and is preferable to "cupping" in many local and chronic forms of inflammation; also in infantile affections which require such an operation, when the American leech is used, as it makes a smaller incision than the European leech, and draws less blood. A leech is supposed to draw, on an average, about a drachm and a half to two drachms of blood before it is removed, and the quantity which subsequently flows will generally equal that drawn by the leech.

Leeches are often applied to the gum over the root of a tooth affected with acute periostitis, to relieve the inflammation and congestion. To make the leech bite readily, the surface to which it is to be applied may be smeared with cream or sweet milk, or a puncture may be made in it, so as to draw blood, and, to isolate the part of the surface on which it is desired to apply the leech, a small hole may be made in a piece of bibulous paper, which will adhere to a dry surface of the gum, and afford an opening for the mouth of the leech to approach the surface.

To remove a leech, if it does not drop off of its own accord, which they will generally do in from fifteen to twenty minutes, it may be sprinkled with a little cold water or diluted vinegar, or powdered sugar. To promote bleeding from leech bites, fomentations or warm dry cloths, or a cupping glass, may be used. To check the hemorrhage from leech bites, which is

sometimes excessive, firm pressure may be made with the finger, or exposure to cold air, or the application of such styptics as alum or matico.

*Cupping* is employed when it is desired to draw blood rapidly, or to ascertain the exact quantity of blood drawn, or when it is desirable to make an impression on the system. Cupping is performed by means of cupping glasses and a scarificator. The glasses are applied after being partially exhausted of air, when the removal of the atmospheric pressure produces a determination of blood to the capillaries of the part, and it is afterwards easily drawn by scarification.

*Scarifications* consist of small incisions made in inflamed and congested parts, to relieve the engorged condition of the capillary vessels, and are sometimes employed to relieve acute inflammation of the gums and mucous membrane of the mouth.

## ERUPTION OF THE TEETH.

### TEMPORARY TEETH.

(The inferior generally precede the superior by two or three months.)

| | |
|---|---|
| Central incisors, | 5 to 8 months. |
| Lateral " | 7 to 10 " |
| 1st molars, | 12 to 16 " |
| Canines, | 15 to 20 " |
| 2d molars, | 20 to 36 " |

### PERMANENT TEETH.

| | |
|---|---|
| 1st molars, | 5 to 6 years. |
| Central incisors, | 6 to 8 " |
| Lateral " | 7 to 9 " |
| 1st bicuspids, | 9 to 10 " |
| 2d " | 10 to 11 " |
| Canines, | 11 to 12 " |
| 2d molars, | 12 to 14 " |
| 3d " | 17 to 21 " |

## ELECTRICITY AS A THERAPEUTIC MEANS IN THE TREATMENT OF DISEASE.

Electricity is a powerful agent in many forms of nervous disease, especially in the treatment of paralysis and neuralgia.

Three forms of electricity are employed, viz.: The *induced current*, the *galvanic current*, both of which are dynamical, and the *static current*, which is frictional.

Galvanic electricity—galvanism, and induced electricity—Faradism, are the two forms generally employed, frictional electricity being but seldom applied. What is known as electro-magnetism is a form of induced current, generated by the rotary instrument, and is not reliable. Faradism, so called from its discoverer, is generated by an instrument which is capable of applying slow or rapid shocks, and giving what is denominated a fine, strong induced current. It consists of coils of wire; a small hammer of soft iron, attached to a spring; a pole, containing a platinum-pointed screw; the hammer breaking the current in the coil of wire, and by rapid vibration producing shocks.

"The galvanic current is generated by a series of cells, sufficient in number to cause a current of tension, which is the resistance offered to the passage of a current.

"One cell supplies a current, the poles of other cells being alternately joined, and there are finally but two terminal poles." As the current from the first cell passes through the remaining cells, its power is increased and the effect is governed by the number of cells belonging to the circuit. There is also what is denominated a current of "quantity," which is generated by a large metallic surface in the battery cell, the tension current being generated by a number of small metal plates. The "tension current" serves the best purpose for medical use, while the "quantity current" furnishes heat, and is, therefore, adapted to purposes of electro-surgery. The modified Bunsen galvanic cell, is the best for medical purposes, although what is known as the Siemens and Halske cell is extensively used; "it consists of an outer cell of glass, with elements of zinc

and copper, a diaphragm of porous earthenware, and a diaphragm of papier mache, between the solutions." The Holtz electric instrument furnishes the best static current.

The Ruhmkorff coil is also employed, in the use of which but one wire is brought in contact with the patient, the other conductor being formed by the air, and a spark, similar to the ordinary spark from the friction machine, being produced.

When electricity is applied to the body, sponges of different sizes, or polished metallic surfaces, known as "electrodes," the metallic being the best, are employed, the effect upon the skin being similar to what is caused by puncturing with many small needles. The theory of *electro-therapeutics* is dependent upon the following effects :—

"If a portion of a motor nerve is included between the poles of a galvanic battery, it is said to be *polarized*, and in a state of electrotonus. At the positive pole, the irritability of the nerve is diminished, while at the negative it is excited and more susceptible to stimulation. The condition at the positive pole is called *anelectrotonus*, and that at the negative *catelectrotonus*. The positive pole is known as the *anode ;* the negative, the *cathode*, and these give the name to the states described. A nerve is said to be *tetanized* when the muscle supplied is thrown into a state of permanent tetanic contraction by a rapidly intermitting current. The passage of a number of these shocks for some time will diminish the irritability of the nerve to such an extent, that, finally, there will be no further response. An ascending current causes a greater irritability in a nerve than a descending one ; a descending one depresses excitability. The stimulus is felt at the negative pole when the current commences, and, when it is broken, it is felt at the positive pole. A shock is felt at the *opening* of the weak currents ; with moderately strong ones, it is felt both at the opening and the closure. With very strong currents, it is impossible to tell the points of sensation, as the power of the nerve is impaired." The action upon involuntary is less than upon the voluntary, and, as regards the latter, it is the same, or nearly so, as long as the integrity of their immediate nerve supply is concerned.

Degenerations and atrophies of muscles interfere to a considerable extent with their susceptibility to electric currents; hence it is better, in diseased conditions, to pass the current through the nerve trunk which supplies them. The Faradic current has but a local effect, the deeper muscles and nerves escaping.

When a metallic or sponge electrode is applied to the moistened skin, a prickling sensation follows, attended with redness and tingling, and this impression on the cutaneous nerves and muscles is known as *electro-muscular sensibility*. The galvanic current occasions a sensation of warmth, like that produced by a local stimulant, such as a mustard plaster, and when the faradic current is applied to the dry skin, or when the electrodes are but lightly applied, there is produced a sensation of pain, and the pain is the greater when caused by rapidly succeeding shocks than by slow ones.

The galvanic current causes deeper impressions than the faradic, and also electrolytic changes different from the faradic, producing absorption and changing the structure of the different tissues, and beneficial results have resulted from its application in diseases of the brain. The physical effects of the galvanic current upon the sympathetic nerve are dilatation followed by contraction of the pupil, diminished frequency of the pulse, and a lowering of the tension of the carotid arteries. When electricity is used for the purpose of diagnosis, the existence of local tenderness, exalted sensibility, anæsthesia, paralysis, diseases of the brain, spinal cord, etc., may be ascertained. It has also been used to determine the question of doubtful death, whether certain affections are recent or of long standing, and to detect malingering. As various nervous diseases are associated with the loss of such functions of muscles as contraction and sensation, or the reverse, electricity determines the extent of such changes.

When applying the electric current, the anatomy of the part affected should be well understood, for example, for neuralgia of the fifth pair of nerves one pole should be applied as near as possible to the point of exit of the nerve

from the cranium, and the other pole to the remote parts of distribution.

Galvanism and Faradism are employed for the relief of pain and spasm, to improve the nutritive processes, and to restore deficient muscular power, to stimulate sensation in nerves, to stimulate secretion, to influence circulation, to cause absorption of fluids, to bring about the absorption of morbid growths and deposits, to induce sleep, and in surgery, in the form of the galvanic cautery. The galvanic current is considered to be the most useful for the mediate, and the faradic current for the immediate application, the former proving serviceable in all forms of neuralgia, and especially in facial neuralgia, and the latter in headaches, especially those of a rheumatic nature.

Galvanism is also employed with advantage in sciatica, spinal irritation and hysteria, also tumors such as aneurisms and goitre, these morbid products being dispersed by connecting the two poles of a galvanic battery with needles, which are thrust into the morbid growth and generate a process known as *electrolysis*. In such operations bubbles of hydrogen gas are disengaged at the negative pole, which separate mechanically the adjacent tissues, breaking them up in such a manner that the disintegrated particles may be taken up by the circulation. Oxygen is disengaged at the positive pole, which forms an acid with certain elements of the tissue, and the albumen is coagulated, forming a clot if this occurs in a cavity filled with blood.

For surgical operations, as a substitute for the knife or écraseur, a platinum wire is placed between the poles of a powerful battery, the wire being adjusted in a handle, which in a few minutes becomes white hot, and is especially serviceable for operations in deep cavities where it would be impossible to use the knife, the application of such a galvanic cautery being unattended by pain or hemorrhage.

Strong currents of electricity should not be applied to the head, nor its use be persevered in for more than fifteen minutes at a time.

Electro-magnetism has been employed for relieving pain during the extraction of teeth, one pole of an ordinary battery being attached to the forceps and the other to a handle which is grasped by the patient. The susceptibility to the current is first ascertained by the patient holding both the forceps and the handle in his hands, and a feeble shock applied, which is gradually increased until the sensation is felt at or just beyond the elbows, when the current is somewhat reduced in power. After the gum has been lanced, the connection is made as before described, by the patient holding the handle and the operator the forceps in contact with the tooth to be removed, the handles of the instrument being isolated, when the operation is at once completed. Great diversity of opinion, however, exists as to the efficiency of this method, which has its advocates and opponents.

## APPENDIX TO DENTAL FORMULARY.

*Dentifrice in the Form of Troches.*

℞. Cretæ Preparatæ..... ℔ iv
Sodii Boratis (Pulv.)... ʒ x
Saponis Castil " ... ʒ x
Sacch. Albæ " ... ℔ iss
Ossis Sepiæ " ... ℔ i¼
Olei Rosæ..... gtt. xxx
Millfleurs..... ʒ j
Essentiæ Jasmin..... ʒ ¼.

Mix with a solution of Gum Syrup.

*Antiseptic Solution for Washing and Spraying Wounds, etc.*

℞. Acidi Carbolici (Cryst.) partem j
Aquæ..... part. xxiv

SIGNA.—Dilute the above solution with equal parts of water, which will make it equal to 1 part of the acid to 40 parts of water; for use in disinfecting instruments and sponges.

*For a Disinfectant in Mercurial Salivation.*

℞. Potassii Permanganat.... gr. xv
Aquæ..... f ʒ viij.

SIGNA.—Use as a gargle.

*For Ulceration of Gums and Mucous Membrane of Mouth.*

℞. Potassii Chloras..... ʒ ij
Aquæ..... ʒ v. M.

SIGNA.—A tablespoonful 3 times a day; also as a gargle 4 or 5 times a day.

*For Neuralgia of the Head.*

VON NIEMEYER.

℞. Ext. Hyoscyami
Zinci Oxidi.....āā..... ℈ ij. M.

SIGNA.—Fiat pill. xj.

Begin with one pill morning and evening, and increase to xx or xxx daily.

*For Sensitiveness Following the Removal of Salivary Calculus.*

COLEMAN.

℞. Acidi Tannici..... ʒ ss
Eau de Cologne.....f ʒ iv. M.

SIGNA.—Add 10 or 12 gtts. of above solution to a teaspoonful of tepid water, and use as a gargle 3 or 4 times a day.

*For Gangrene of Mouth (Cancrum Oris).*

℞. Bismuthi Subnitratis (Powd.)

Applied to ulcerated surface and covered with absorbent cotton.

For internal administration, to support the strength:—

℞. Quininæ Sulphat..... gr. iij to v
Tinct. Ferri Chloridi... gtt. v. M.

SIGNA.—Three times daily.

*For Pulpitis.*

GARRETSON.

℞. Creasoti..... gtt. vj
Tinct. Iodinii..... ℥j
Liq. Plumb. Subacet... ℥j
Chloroformi
Tinct. Opii.....āā..... ℥ss. M.

SIGNA.—Apply, on cotton, to exposed surface of pulp.

*For Neuralgia of Superficial Nerves.*

AITKEN.

℞. Atropinæ Sulphat..... gr. v
Aquæ Destillat..... f℥iij. M.

SIGNA.—Use on a compress and renew several times in 24 hours, and continue for at least one hour at a time, covering with oilskin, to prevent evaporation.

*For Facial Neuralgia.*

WALES.

℞. Potassii Bicarb..... ℥ss
Ext. Ergotæ fluidi..... f℥j
Infusi Ergotæ..... f℥vj. M.

SIGNA.—Two tablespoonfuls every 4 hours.

*For Neuralgia..*

℞. Zinci Valerian..... ℈ij
Ext. Gentianæ..... ℈j
Ext. Nucis Vom..... gr. v. M.
Fiat pill, No. xx.

SIGNA.—One pill three or four times a day.

*Oxychloride of Zinc Preparation for Filling Teeth.*

POWDER.

℞. Zinci Oxidi..... gr. xxx
Sodii Boratis..... gr. ij
Silicii (Fine Powd.).... gr. j.

Mix thoroughly and subject to a bright red heat in a crucible. Then grind this frit to a powder, and mix it with three times its weight of Calcined Oxide of Zinc.

LIQUID.

℞. Zinci Chloridi (deliq.) f℥j
Aquæ..... f℥v to vj.

*Oxyphosphate of Zinc Preparation for Filling Teeth.*

POWDER.

℞. Zinci Oxidi..... partes 200
Silicii (Fine Powd.)... partes viij
Sodii Boratis..... partes iv
Pulv. Glass..... partes v.

Levigate under water, to ensure complete admixture, and dry by evaporation; then calcine at a white heat; then reduce to powder.

LIQUID.

℞. Acidi Phosphorici
Aquæ.....q. s. to dissolve,

And evaporate the solution by aid of heat, until it is of the consistence of glycerin.

*Another Formula for the Oxyphosphate Preparation*, in which simply the calcined oxide of zinc and glacial phosphoric acid are employed, is prepared as follows:—

Calcine the oxide of zinc for two hours, at a white heat, or until it becomes a hard, yellowish mass; then pulverize in a mortar, and sieve through fine bolting cloth. For the liquid, take ℥j of Glacial phosphoric acid (German) in crystals, and dissolve in f℥j of water, and then evaporate to one-third, on a sand bath.

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# INDEX TO DENTAL FORMULARY.

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