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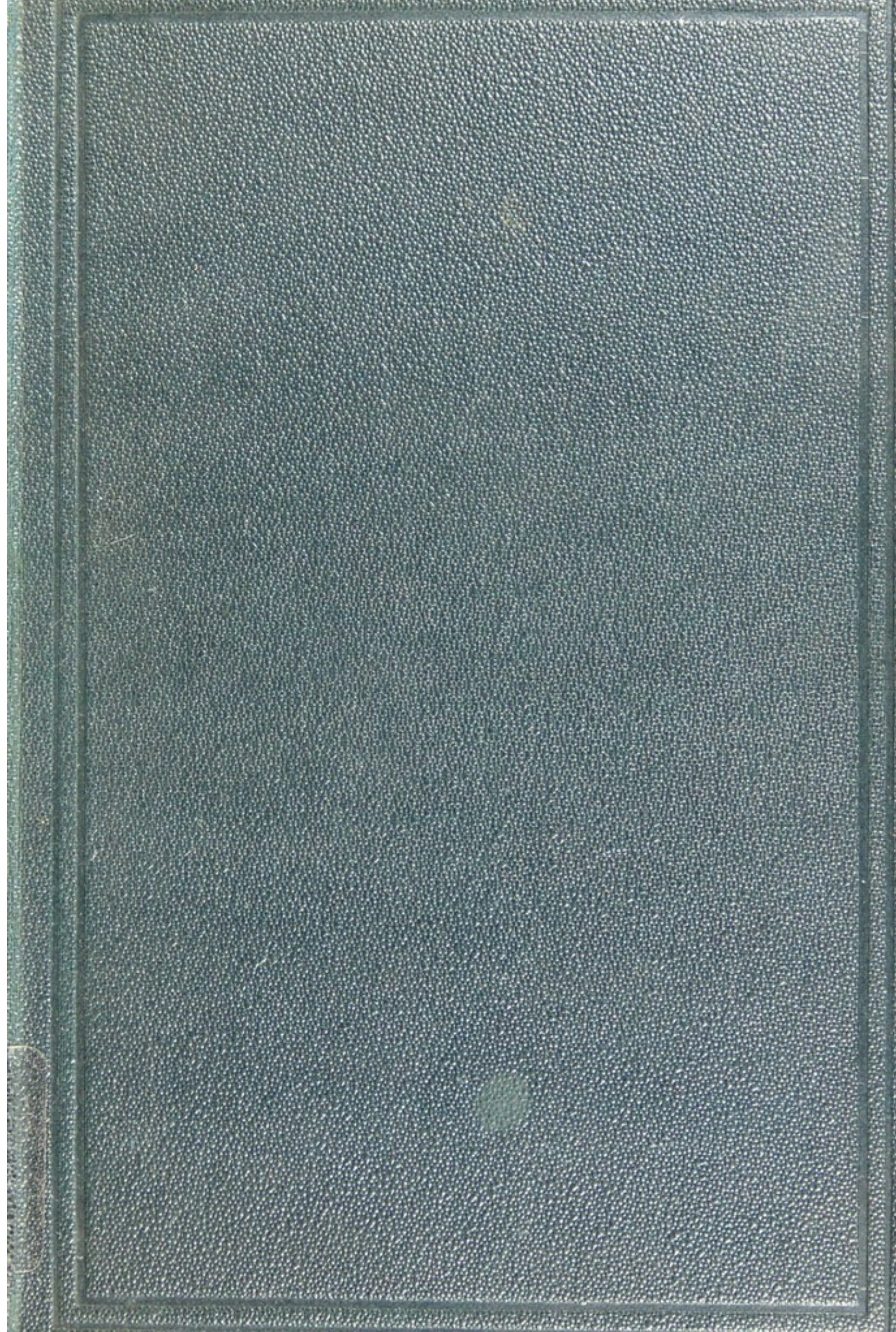
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DENTAL MATERIA MEDICA
PHARMACOLOGY
AND THERAPEUTICS

NEWTON SPYER
DISPENSING CHEMIST
* 13, GLEDHOW TERRACE *
SOUTH KENSINGTON



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DENTAL MATERIA MEDICA PHARMACOLOGY AND THERAPEUTICS

BY

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THERAPEUTICS TO THE COLLEGE



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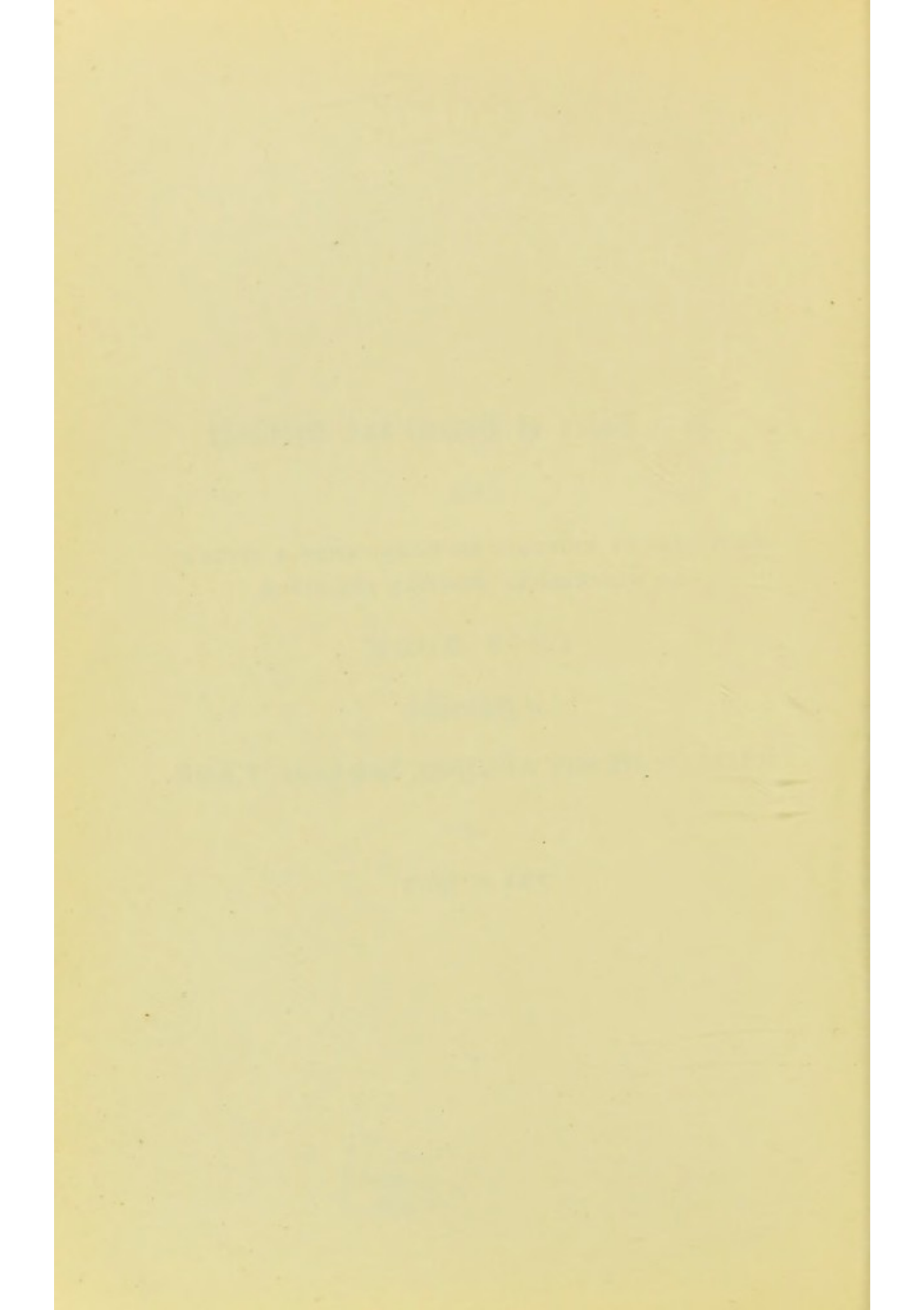
THIS BOOK

is Dedicated to

WILLIAM HENRY ALLCHIN, M.D.LOND., F.R.S.E.

BY

THE AUTHOR



PREFACE

FOR some years past, there has been a need felt for a work on Dental Materia Medica, which would be at once concise, and at the same time supply all the information required in the study and practice of Dental Surgery.

To a large extent, the material of this book is a reproduction of my lectures given at the National Dental Hospital and College for the last eight years ; but, as new drugs are continually being brought forward, an elaboration was necessary to make the work as complete as possible.

Advantage has been taken of the various works on Materia Medica, Pharmacology, and Therapeutics, notably those of Drs Murrell, Mitchell Bruce, and Phillips, and Dr Gorgas's work on Dental Medicine.

Under the heading "General" Therapeutics, I have merely mentioned some of the diseases for which the drug is used, further details being out of

place in a book of this kind. Under "Dental" Therapeutics, an endeavour has been made to classify the dental uses of a drug according to its pharmacological action.

Dr Murrell has not only perused the whole of the manuscript, but has given many hints, the value of which cannot be over-estimated by one who is making his initial attempt at authorship.

To add to the usefulness of the volume, there is appended a short chapter on Anæsthetics suitable for Dental Operations. This has been kindly undertaken by my colleague Dr Maughan, and I feel satisfied from personal experience that his treatment of the subject will be found intelligent and practical.

6, PELHAM CRESCENT,
SOUTH KENSINGTON.
September, 1896.

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DENTAL MATERIA MEDICA, PHARMACOLOGY, AND THERAPEUTICS

MATERIA MEDICA is that branch of science which teaches not only the names of drugs employed in the treatment of disease, but also their sources, composition, preparations, properties, and doses.

THERAPEUTICS teach us how to use these drugs for the cure, relief, or prevention of disease. There are, however, many other ways of treating disease than those with drugs, therefore it is advisable to consider first—

The Objects of treatment,
The Indications for treatment,
The Methods of treatment.

1. **THE OBJECTS** to be kept in view are as follows :

(a) To cure our patient as speedily and completely as possible. This is termed **curative** treatment. As a dental example: by extracting a buried root, which is causing an acute alveolar abscess, pain is at once relieved, and a cure effected.

(b) **Expectant** treatment. To guide the progress of a case towards a favourable termination when it is not directly curable. Example: an irritated or inflamed

pulp; by careful capping with suitable drugs the inflammation may be relieved, and the pulp saved.

(c) The third object is to remove, or relieve symptoms. **Symptomatic and palliative** treatment. The first is not always advisable, as one would only be trying to cure the *effect* of a disease instead of treating the *cause*; at the same time, in some cases it is impossible to find or remove the cause, and then the symptoms must be treated.

Palliative measures are in certain cases of great service. Take, for instance, a case of neuralgia due to exostosis of several teeth. It would be of little or no good to give any drug to relieve the neuralgia, but by extracting a certain tooth, in which the pain is located, relief would be obtained for a time, although the disease existed in other teeth, which would ultimately have to be removed before a cure could be effected.

(d) The fourth object is to prevent disease—**preventive or prophylactic** treatment.

In general practice this is carried out, in a great measure, by attention to all hygienic conditions. It also includes attention to the general health of a patient, in order to obviate any tendency to disease; to prevent a disease extending to another, as in ringworm, or to the same patient, as in purulent ophthalmia; vaccination, to prevent smallpox; the warding off of habitual attacks, such as gout, &c. In dental practice, **preventive** treatment is carried out in several ways. In the first place, by the strictest attention to the *hygiene* of the oral cavity, such as keeping the teeth clean by means of suitable tooth-

powders and tooth-brushes. As regards the former, they should be thoroughly pulverised—not gritty, and consist of alkaline substances, with an antiseptic agent. The latter should have bristles of medium stiffness, not too hard, and be applied not so much with a to-and-fro motion, as is generally the case, but rather with an upward and downward action, accompanied with a rotary motion. They should be thoroughly cleansed after use, and allowed to dry on an *open* receptacle, not a *closed* one. Approximal surfaces should be cleansed with floss silk, pieces of tape, or strips of india rubber.

Antiseptic mouth-washes are of great importance in keeping the cavity in a healthy state. Such drugs as “Saccharin,” Benzoic Acid, “Listerine,” &c., are most excellent for daily use, in addition to a tooth-powder, in preventing the formation of bacteria.

Then again, the mouth and teeth are as a rule absolutely neglected in the sick room. This should not be so. Much harm is done to the teeth during a severe illness. It is in such cases that they require more attention than in health (see Listerine).

Teeth should be cleansed after every meal, or at least twice a day, more particularly at night.

Preventive treatment, as it affects the teeth, is also carried out by the judicious removal of certain teeth to prevent overcrowding; also in cases of incipient caries, where by carefully drilling out, not only a slight discolouration of enamel, but extending the cutting operation to a certain margin beyond what is actually seen, and properly filling, one makes sure of preventing any recurrence of caries round the edges

of the cavity. Then in very deep fissures of the teeth, where there is no actual decay, it is often advisable to cut out a cavity, and fill with some suitable stopping, to prevent retention of food particles, which induce caries. When patients are taking any medicines such as the Mineral Acids or Perchloride of Iron, they should always be advised to rinse out their mouth with plain or alkalised water, or to take the drug through a straw, to prevent injury to the teeth. Extra attention and cleanliness is also needed with patients who are undergoing Mercurial treatment for syphilis.

2. THE INDICATIONS FOR TREATMENT.—These depend on the nature and seat of disease, and on the symptoms present, which may not only call for the adoption of certain measures, but may contra-indicate a line of treatment which would otherwise be followed. Take, for instance, a case of a carious lower wisdom tooth, the pain of which is frequently reflected to the bicuspid region. If due care be not taken to examine the wisdom tooth, one of the bicuspids is treated, perhaps with extraction, and the pain remains. Again, our treatment varies when a pulp is exposed according to the cause, and also as to its condition, whether it is inflamed, ulcerated, or only simply exposed.

The condition of lungs, heart, and kidneys considerably influences treatment, and renders an examination of one or all of these organs necessary. In the administration of anæsthetics, the choice of Chloroform, Ether, or the A. C. E. mixture, will in a great measure depend on the state of the heart or the lungs,

and the age of the patient. Ether is dangerous by gas-light, or when the actual cautery has to be used, also in people suffering from bronchitis.

3. THE METHODS OF TREATMENT.—(a) By means of drugs given internally. (b) By the use of local and external applications and electricity. (c) By attention to diet and general hygiene. (d) By operations.

ROUTES BY WHICH MEDICINES ENTER THE CIRCULATION

Medicines enter the circulation when they are either applied **externally** or administered **internally**.

- | | | |
|---------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I. EXTERNAL | { | 1. The En-epidermic method.
2. The Epidermic ”
3. The Endermic ”
4. The Hypodermic ”
5. To Serous Cavities.
6. To wounds and diseased surfaces.
7. The Intra-venous method. |
| II. INTERNAL | { | 1. By Inhalation.
2. By the Mouth.
3. By the Rectum. |

I. Externally.—1. *The En-epidermic* method consists of the application of plasters, blisters, poultices, lotions, &c., to the skin.

2. *The Epidermic*, or method by inunction, is the application of drugs to the skin, aided by friction.

3. *The Endermic* method consists first in the appli-

cation of a blister which raises the cuticle, opening the bleb, allowing the serum to escape, and applying a drug to the raw surface. This process, however, is not only slow, but is very painful, and if applied to the face would be disfiguring. It is now almost entirely superseded by the following :

4. *The Hypodermic method*.—This is now a favourable method of introducing drugs into the system, but unfortunately very few are available for the purpose. A graduated syringe is required, and the following directions must be carried out. Pick up a fold of loose skin between the thumb and forefinger, push the point of the needle right through the skin till its point works easily in the tissues beneath. Then inject slowly, and when withdrawing, press firmly with the finger, and keep it over the puncture for a minute, to prevent the fluid escaping. A few conditions are necessary for the success of the operation, viz.—1. The fluid to be injected must be small in bulk and unirritating to the part. 2. Care must be taken not to puncture a vein, also not to introduce the needle too deeply, and not at the same point on subsequent injections.

The effects of a drug are more rapidly obtained by this method than when administered internally. When Morphine or any anodyne is used in painful cases, the relief obtained is, as a rule, so great that the patient will beg and entreat for more on return of the pain. It is therefore necessary not to resort to this form of remedies unless absolutely obliged, as the dose (which should always be small at first) will have to be gradually increased in order to have the

desired effect. In dentistry, it is occasionally used for the relief of neuralgia in severe cases (see Morphine), also in the use of Cocaine for the extraction of teeth (see Cocaine), and for the administration of Ergotin in cases of alveolar hæmorrhage (see Ergot).

Hypodermic injections are now rendered comparatively easy by means of "Tabloids," and for dental purposes the "Dental Hypodermic Case" of Burroughs, Wellcome & Co. is most useful. It contains a suitable syringe, with both curved and straight incorrodible needles, a removable syringe-holder, and "tabloids" of Cocaine Hydrochlorate $\frac{1}{4}$ and $\frac{1}{2}$ gr. for extraction of teeth and obtunding sensitive dentine (see Cocaine), Atropine Sulphate $\frac{1}{50}$ gr. for neuralgia, Apomorphine $\frac{1}{10}$ gr. (an emetic), Caffein Sodio-Salicylate $\frac{1}{2}$ gr., a restorative, Morphine Sulphate $\frac{1}{4}$ gr., and a small glass mortar and pestle.

5. *To serous cavities.*—Drugs are frequently applied to serous cavities, not only for antiseptic purposes, but also as "irritants," to set up adhesive inflammation. This is seen in cases of ranulæ (see Iodine, p. 92).

6. *To wounds and diseased surfaces.*—This applies to those cases where poultices, lotions, or ointments are applied to ulcers, gargles to the mouth, injections into the nose and antrum, or—to travel somewhat from the domains of dental surgery—into the urethra, vagina, or rectum.

7. *The intra-venous injection of drugs* is now rarely used, and a description of the method is unnecessary in a work of this kind.

II. Internally.—1. *By Inhalation.*—By this method,

drugs enter the system in a greater state of purity than by any other. It is used chiefly in throat and lung disease. For a description of the inhalation of Dental anæsthetics see **Anæsthetics**.

2. *By the Mouth*.—This is the most useful and convenient method of administering drugs, but has a few disadvantages, such as the patient tasting the drug, which unless disguised with some flavouring agent, or is in the form of a pill, capsule, or “cachet,” is often nauseous, or from its interference with the function of digestion, or, on the other hand, the process of digestion, preventing its proper absorption.

3. *By the Rectum*.—It is sometimes inadvisable to administer medicines or food by the mouth, and they are given *per rectum* in the form of enemata, of which there are three kinds: purgative, absorptive and nutritive.

(a) *Purgative*.—For easy and efficient evacuation of the large bowel, no method can compare with this. Sometimes an injection of warm water alone will be sufficient for this purpose, or soap and water, thin gruel, or castor oil may be used. Whether a simple enema is required, or one with Castor Oil, Aloes, &c., the quantity of the injection should be made up to about twelve ounces or one pint. Purgative enemata act not only mechanically by washing out the bowel, but they also stimulate its action.

(b) *Absorptive*.—These, as their name implies, are intended to be absorbed, and therefore should not be of large bulk (about one to two ounces), or they will excite the expulsive action of the bowel.

(c) *Nutritive*.—These are used in cancer and stric-

ture of the œsophagus, ulcer of the stomach, &c., where the patient either cannot swallow, or vomiting is excited by the entrance of food into the stomach. The articles generally used are beef-tea, eggs, milk, brandy, &c., and these are often mixed with Pepsin or Pancreatin to aid their digestion.

In addition there are *anthelmintic* enemata which expel worms, *antipyretic* enemata to reduce temperature, and *styptic* enemata to arrest hæmorrhage.

Where the different forms of injections cannot be retained, suppositories may be used instead.

PHARMACOLOGY

THE ACTION OF MEDICINES

PHARMACOLOGY is the science of the action of remedies, and deals with the modifications produced in healthy conditions by the operation of substances capable of producing modifications. It means the same as the expression "the physiological action of drugs" (Murrell).

Medicines, when taken into the system, undergo various changes, which in a great measure depend upon, and are modified by, what we eat and drink, by the temperature of the body, the state of the system, and by their tendency to combine with other substances and form fresh compounds. Some drugs will be considerably altered by the action of other substances; for instance, in a case of poisoning by

Corrosive Sublimate, by giving white of egg at once, an insoluble Albuminate of Mercury is formed, which renders the poison harmless. On the other hand, a patient has, in years gone by, suffered from syphilis, and was under mercurial treatment for some time, and it (the Mercury) has accumulated in his system, in the form of an Albuminate of Mercury. After a lapse of time he consults another practitioner, as he has developed some tertiary symptoms of the disease, who gives him Iodide of Potassium, and after he has taken a few doses, symptoms of mercurial poisoning occur. This is caused by the Iodide of Potassium rendering the insoluble Albuminate of Mercury soluble, so that an Iodide of Mercury is formed, which is one of the most active forms of Mercury.

The rapidity with which drugs enter the blood depends in a great degree on their composition. Certain substances (*crystalloids*) pass through animal membranes very easily, whilst others (*colloids*) do so very slowly or not at all. For instance, Arsenic is a crystalloid, and on account of this, great care must be exercised when using it for dental troubles. Some drugs, when properly administered, simply modify the vital conditions of the system; but at times, either from some unknown cause or from being improperly used, will cause death. Take, for instance, any of the general anæsthetics, which, when administered up to a certain stage, produce unconsciousness, and so act as a medicinal agent; but if the drug be pushed, it would in all probability cause death, and so act as a poison. Some drugs not only destroy life, but also destroy the parts with which they come in contact, as

in the case of the corrosive poisons; others cause death, without the destruction of tissue.

When pharmacological effects of drugs occur in the parts to which they are applied, they are called *topical* or *local* effects; when in more or less distant parts, they are *remote*. For example, in neuralgia, not of dental origin, by applying a liniment of Chloroform and Aconite, relief may be obtained. This would be a *local* effect. Then drugs which act on the stomach and intestines, such as emetics and purgatives, are obviously *local* in their action. In a case of dropsy, on the other hand, by giving drugs to act on the liver, kidneys, or heart (according to the cause), which produce a diminished amount of fluid, a *remote* effect would be obtained. Some drugs have a *specific* action on certain tissues and organs, *e.g.* Alcohol on the brain, Strychnine on the spinal cord, Cantharides on the kidneys. Others operate through nervous agency. Briefly speaking, there are two sets of nerves—*afferent* and *efferent*. The former convey impressions to the nerve-centre, whilst the latter transmit impressions *from* the centre to muscles, glands, vessels, &c. It is by means of these afferent or sensory nerves, that the effects of drugs are conveyed to the brain, whereby an excitement of a nerve-centre is caused, and a *reflex action* is transmitted along the efferent nerves, causing certain phenomena to occur.

When medicines enter the circulation, they are conveyed by it to various parts of the body, and in their transit may cause alterations in the character and composition of the blood. For instance, Iron will

produce, not only a change in the colour of the red corpuscles, but an increase in their number.

Medicines, poisons, and other substances, after they have been conveyed to the different tissues and organs by the blood, are got rid of by the excretory organs, which expel them from the system. Some drugs pass out by one organ, some by another, *e. g.* Camphor and Alcohol by the lungs and kidneys, Saline matters by the kidneys and skin; the alkaline Bromides have been found in the urine and saliva, five minutes after a dose of 15 grains (Rabuteau).

The effects of medicines are greatly modified by the form in which they are administered, *e. g.* Morphine is far more active in solution than when given in the solid form. On this account, and because the smallness of the dose does not upset the stomach, it is used hypodermically. When the prompt action of a drug is required, it should not be given in the form of a pill, as time would be required for dissolving the pill mass (unless the pill is made with syrup or some other substance which will allow of its prompt disintegration) before any effect of the drug could be obtained.

Pharmaceutical Combination also alters the action of drugs. For instance, with diuretics, three or four members of this group often act beneficially where only one would produce little or no effect. It also corrects their action, as in syphilis, when Opium is given with Mercury, to prevent the purgative action of the latter, so that the patient comes thoroughly under the influence of the drug. Then again, by the joint action of two drugs an effect is gained, which could not be otherwise obtained by one only, *e. g.*

Opium and Ipecacuanha act quite differently when prescribed alone, but when combined in the form of Dover's powder, form one of the best diaphoretics we have.

The effects of medicines are also modified by—

(a) **Age.**—In young children, only small doses should be given (see p. 38) ; and as we come again to old age, so as a rule must small doses be administered. This is a general rule, but there are exceptions. For instance, care must be taken, when it is absolutely necessary to give Opium to young children, but Mercury and its preparations can be taken for a long time by such subjects, without the usual effects of mercurialization being produced. It is an important fact, that children can often take, not only with impunity, but even with decided benefit, quantities of active remedies which will correspond to the full adult dose (Farquharson). In cases of chorea, the author has seen children start with three minims of Liq. Arsenicalis, which has been gradually increased up to thirty.

(b) **Climate** considerably influences the effects of drugs. Narcotics act more energetically in hot climates ; Calomel, the reverse.

(c) **Disease.**—Different diseases exercise great influence on the effect of drugs. This is well seen in tetanus, when Opium has hardly any effect in allaying the spasms.

(d) **Toleration and Habit.**—Some drugs lose their effects when continued for any length of time. This is notably the case with narcotics, the dose of which has to be increased from time to time in order to have the same effect. Arsenic has the same peculiarity, as

is seen with the arsenic eaters of Styria, who, by the long-continued use of the drug, are at last able to take in one dose what would be sufficient to kill several people.

(e) **Idiosyncrasy.**—This is a peculiar susceptibility of some individuals to the action of certain drugs; *e. g.* a patient will become profusely salivated with a grain of Calomel, another has violent headache and singing in the ears from Quinine, and a third becomes furiously excited by Opium. On the other hand, many are able to take large doses of a drug without its having any effect whatever.

(f) **Mind.**—That the mind influences the effects of medicines on the system there can be no doubt. How often do we give the same drug for the same disease to two different patients, and find that the one who is naturally of a cheerful disposition, and who believes he will obtain relief, soon gets well; whilst the other, who is of a morose and moody disposition, obtains no relief whatever!

(g) **Sex.**—Females are subjected to conditions and diseases which never happen to man; therefore the administration of drugs at certain times must be modified or avoided. During the periods of menstruation, pregnancy, and lactation, great care must be taken when prescribing certain drugs, and in the two last-mentioned conditions, the question of careful dieting must also be taken into consideration.

PRESCRIBING

Compared with medical practitioners, a dental surgeon has only an occasional necessity to write a prescription.

When this arises, he should be able to do so with a result that is satisfactory both to his patient and himself. The most frequent prescription he is called upon to write is for a tooth-powder. This is a very simple affair. In the majority of cases, three ingredients are wanted,—a basis, an antacid, and an antiseptic. Precipitated Chalk is used for the first, in all cases, Light Magnesia for the second, Carbolic Acid or Eucalyptus Oil for the third.

We can now ring the changes on this prescription, *ad infinitum*. For instance, some prefer a saponaceous dentifrice; then, all that is necessary is to add powdered White Soap. Should something gritty be required for occasional use, a little Cuttle-fish Powder can be put in instead of the soap. If astringency be required, Tannic Acid or Yellow Cinchona can be prescribed. Should a powerful antiseptic powder be wanted, Boric and Benzoic Acid can be used. Flavouring agents are Otto of Roses, Oil of Cloves, Eucalyptus, &c.

Mouth-washes are used as a rule, either for antiseptic or astringent purposes, or both. One of the easiest prescriptions to remember for this purpose is "Listerine," and it is one of the best; but should something more astringent be wanted, Tannic Acid and Rose Water can be used.

At times, the dental surgeon has to write a prescription for the relief of neuralgia of dental origin, but in the majority of cases, it is far preferable, after having examined and treated the teeth, to refer the case to the medical practitioner. By so doing, he will be keeping well within the limits of dental surgery.

When writing prescriptions, it is wise to avoid giving a combination of drugs forming an unsightly mixture. There is seldom any need to write a prescription with *more* than half a dozen ingredients. Two or three will generally meet most cases. The author once saw a prescription for a mouth-wash that contained no less than eight antiseptics. The prescriber was evidently determined not to give the bacteria of the mouth much chance of doing any injury to the teeth, or perhaps was trying to prove that dental caries was a purely chemical action.

It is, however, well known that some drugs, when properly combined, materially assist the action of others; but if one is *certain* of the action of a single drug, by all means use it without combination.

When it is desirable that a medicine be quickly absorbed, it should be given in the form of a solution, and on an empty stomach. If given in the form of a pill, time is required for its solution, unless mixed with certain substances (see p. 12).

Many drugs require to be given at certain times; for instance, Cod-liver Oil should always be given *after* meals, as it is then more readily absorbed, and is less likely to cause nausea and vomiting. Drugs which are likely to irritate the mucous membrane of the stomach, such as Phosphorus, Permanganate of Potas-

sium, and Arsenic, are given after meals, though in the last-mentioned drug, if only small doses are given, better effects are produced by giving it before meals (Murrell).

Medicines intended to produce sleep should be given at bedtime, with the exception of Sulphonal, which should be given two or three hours before, as it dissolves slowly. Alkalies, when administered to increase the action of the gastric juice, should be given before meals, as they help to digest the food.

Always flavour children's medicines with syrups or aromatics.

Use care when prescribing for women who are suckling or pregnant.

THE PRINCIPLES OF DOSAGE

There is a wide difference of opinion as regards dosage. Some men believe in the ordinary doses of a drug, at stated times, such as every four hours, or three times a day; whilst others pin their faith to smaller doses at more frequent intervals. Where one practitioner would give five drops of Tincture of Aconite every three or four hours, another prefers to give drop doses every half-hour. In the latter case, one might be accused of gradually approaching the ground of Homœopathy. But this would not be at all true, for it is well known that in certain cases greater advantage may be obtained by giving small doses of a drug frequently repeated, than by administering it in the orthodox manner of the "British Pharmacopœia." On the other hand, far better results are seen when

one large dose has been prescribed. This is evident with drugs like Quinine and Opium. With the former, a single dose of 10 or 15 grs. will frequently reduce high temperature in a marvellous manner; and in the latter, large doses will bring about sleep, whilst smaller ones would only excite and annoy the patient.

The student may complain that it is very difficult to remember the various doses of drugs. This is not so. By reference to the Posological table, he will see that infusions, decoctions, tinctures, pills, &c., are always administered in certain quantities, with a few exceptions. He has, therefore, only to remember that the majority of infusions are given in doses of 1 to 2 ounces, tinctures, $\frac{1}{2}$ to 2 drachms, decoctions, 1 to 2 ounces, pills, 5 to 10 grains, &c., and then learn the exceptions, and also those drugs which are given in very small doses, such as Aconitine, Arsenic, Phosphorus, &c.

It has been previously pointed out that children require smaller doses than adults, with certain exceptions, viz. Mercury, Arsenic, and Belladonna; but even in these cases the dose must be gradually increased.

Be careful when ordering drop doses, as the size of a drop differs according to the shape of the bottle and the density of the fluid.

INCOMPATIBILITY

The chances of a Dental surgeon prescribing an incompatible mixture, compared with those of a consulting Physician or Medical practitioner, are very

rare, for the simple reason that the former writes one prescription where the two latter write a hundred or more.

The following are a few indications to prevent a Dental Student writing an incompatible prescription.

Iron with Decoction of Cinchona forms a nasty black-looking mixture.

A mixture of Chlorate of Potassium, Tincture of the Perchloride of Iron, and Glycerine has been known to explode if kept in a warm place (Murrell).

Permanganate of Potassium and Glycerine form a dangerous combination.

Chromic Acid explodes if mixed with Glycerine.

Tannic Acid interferes with the action of Salicylic Acid.

In many cases, drugs are physiologically incompatible by reason of one drug acting on the other and rendering it inert. On the other hand, incompatible mixtures are sometimes prescribed in order to obtain some therapeutical advantage.

PRESCRIPTION WRITING

In former years, all prescriptions were written in Latin, including the directions to the patient as to how the drug was to be taken. As this caused mistakes at times, the latter part of the prescription is now, as a rule, written in English.

All prescriptions start with the sign *R*, an abbreviation for *recipe*, "take." This is followed by the drugs required, which should be written in the genitive case.

In the majority of cases, however, the drug is abbreviated, *e. g.* "Liq. Hydrarg. Perchlor." To the right-hand side is put the quantity required in Roman figures and apothecary signs, though it is much better to minimise any error being made, and write them in English as follows: "20 grains," "1 ounce," "2 drachms," &c.

Where there is the slightest chance of one drug being mistaken for another, always write it in full. For instance, "Acid Hydroc. dil." may either mean dilute *hydrochloric* acid or dilute *hydrocyanic* acid.

A prescription consists of four parts, viz.—The *superscription*, which consists of the sign R; the *inscription*, which contains the names and doses of the drugs prescribed; the *subscription*, directions to the dispenser; the *signature*, directions to the patient.

It is customary to arrange the constituents of the inscription under four headings, viz. the *basis* or active ingredient, the *adjuvant* or auxiliary, the *corrective*, to limit or modify the action of the two former, and the *vehicle* or *excipient*, to bring the whole to a convenient form of administration. In addition to these, one must not forget some *flavouring* agent, when ordering a mixture or draught.

It is, however, not absolutely necessary that every prescription should contain all these. For instance, in the following there is no need for a corrective:

Superscription R.

Inscription	{	Ammonii Chloridi, ʒiij (Basis).	
		Tincturæ Gelsemii, ʒj (Adjuvant).	
		Spiritûs Chloroformi, ʒiiss (Flavouring	
		Aquæ, ad ʒvj (Vehicle).	[Agent].

Subscription.—Misce, fiat mistura.

Signature.—Two tablespoonfuls to be taken every two or three hours.

Patient's name

Practitioner's name or

Date

initials.

It will perhaps be noticed that the prescriptions in this book are written in English. This is done purposely, to prevent any printers' errors occurring.

Some of the Abbreviations used in Prescription Writing

<i>Abbreviations.</i>	<i>Latin word.</i>	<i>English word.</i>
āā ...	Ana (Gr.) ...	Of each.
Ad lib. ...	Ad libitum ...	At pleasure.
Ad saturand. ...	Ad saturandum ...	Until saturated.
Aq. ...	Aqua ...	Water.
Aq. dest. ...	Aqua destillata ...	Distilled water.
Aq. ferv. ...	Aqua fervens... ...	Hot water.
Aq. tepid... ...	Aqua tepida ...	Warm water.
Coch. ...	Cochlear ...	A spoonful.
Coch. mag. ...	Cochlear magnum ...	A tablespoonful.
Coch. parv. ...	Cochlear parvum ...	A teaspoonful.
C. or Cong. ...	Congius ...	A gallon.
Ext. ...	Extractum ...	An extract.
F. or Ft. ...	Fiat vel fiant... ...	Let there be made.
Garg. ...	Gargarysma ...	A gargle.
Haust. ...	Haustus ...	A draught.
Infus. ...	Infusum ...	An infusion.
M. ...	Misce ...	Mix.
Mist. ...	Mistura ...	A mixture.
Pil. ...	Pilula vel pilulæ ...	A pill or pills.
Pulv. ...	Pulvis vel pulveres ...	A powder or powders.
q. s. ...	Quantum sufficit ...	A sufficient quantity.
R. ...	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.

Signs and Symbols of Prescription Writing

lb.	...	...	Libra	...	...	A pound.
℥	...	...	Uncia	...	...	An ounce.
℥	...	...	Drachma	...	...	A drachm.
℥	...	...	Scrupulum	...	...	A scruple.
f. ℥	...	...	Fluiduncia	...	...	A fluid ounce.
f. ℥	...	...	Fluidrachma	...	...	A fluid drachm.
M.	...	...	Minim...	...	...	A drop.
Gr.	...	...	Granum	...	...	A grain.
Gtt.	...	...	Gutta vel Guttae	...	...	A drop or drops.
O.	...	...	Octarius	...	...	A pint.

WEIGHTS AND MEASURES

The present recognised Weights of the British Pharmacopœia are the grain, the ounce, and the pound. Two others are unofficially used, viz. the drachm and the scruple, though the latter is now nearly discarded.

Avoirdupois weight is now used instead of the Troy or Apothecaries' weight, and is as follows :

Official.

1 grain.

1 ounce = 437·5 grains.

1 pound = 16 ounces = 7000 grains.

Non-official.

1 scruple = 20 grains.

1 drachm = 60 grains.

Measures of Capacity.

1 minim.

1 fluid drachm = 60 minims.

1 fluid ounce = 8 fluid drachms.

1 pint = 20 fluid ounces.

1 gallon = 8 pints.

RELATION OF MEASURES TO WEIGHTS

	Grains of water.
1 minim is the measure of	0.91
1 fluid drachm ,,	54.68
1 fluid ounce ,, ,,	1 ounce or 437.5
1 pint ,, ,,	1.25 pounds or 8750.0
1 gallon ,, ,,	10 pounds or 70000.0

Domestic Measures.—When using harmless drugs one sometimes tells a patient to take a few drops of one, or a tea-spoonful, table-spoonful, or wine-glass of another. As these articles vary in size, the following is an approximate measurement of each.

1 Tea-spoonful = 1 fluid drachm.

1 Dessert-spoonful = 2 fluid drachms.

1 Table-spoonful = 4 fluid drachms.

1 Sherry glass = 2 fluid ounces.

1 Tea-cup = 4 fluid ounces.

It is much better, however, to use a graduated measure glass.

The Metrical System.—This system has been in use for some years on the Continent, and from its great

convenience will be no doubt shortly adopted in this country.

1 Milligramme	=	$\frac{1}{1000}$	of a gramme.
1 Centigramme	=	$\frac{1}{100}$	„ „
1 Decigramme	=	$\frac{1}{10}$	„ „
1 Gramme	=	weight of 1 cubic centimetre of water at 4° C.	
1 Decagramme	=	10	grammes.
1 Hectogramme	=	100	„
1 Kilogramme	=	1000	„
A Gramme	=	15.432	grains.
A Litre	=	2.113	pints.

THE CLASSIFICATION OF DRUGS

The various authors on *Materia Medica* and *Therapeutics* have each given a different classification of medicinal substances, but as in a work of this kind there is no need to consider *all* the drugs in the *Pharmacopœia*, the author has simply placed each form of drug in alphabetical order, special stress being laid on those which are applicable to dental surgeons, whilst those which are not of great dental interest, are but lightly touched upon.

Absorbents or Desiccatives.—Substances which check or dry up secretions and foul discharges. Examples:—Charcoal, Tannin, Starch, Oxide of Zinc, &c.

Alteratives.—Medicines which alter certain morbid conditions of the various systems of the body and restore healthy functions. Examples:—The preparations of Mercury, Iron, Iodide of Potassium, Chlorate

of Potassium, Chloride of Ammonium, Nitro-hydrochloric Acid, &c.

Anæsthetics.—Medicinal agents which are used in surgical practice for the prevention of pain. They are divided into general and local anæsthetics.

General Anæsthetics are in the form of vapours or gases applied by inhalation, and possess the power of temporarily suspending animation, rendering the patient insensible to pain, and relaxing muscular spasm. Examples :—Chloroform, Ether, Nitrous Oxide Gas, Methylene, Di-chloride of Ethidene, and the A. C. E. mixture.

Local Anæsthetics cause loss of pain to the part to which they are applied, by their action on the sensory nerves. Examples :—Cocaine, Aconite, Ether Spray, Atropine, Ice, &c.

Anodynes.—Allay pain and diminish spasm. Examples :—Opium, Morphine, Aconite, Belladonna, Atropine, Dilute Carbolic Acid, &c.

Antacids.—Neutralise acidity of the various secretions and the blood. In dental practice, they are used in the form of mouth-washes and tooth-powders, to prevent the deleterious action of acid fluids on the mouth, and acid medicines on the teeth. Examples :—Bicarbonate of Sodium and Potassium, Magnesium, Precipitated Chalk, Lime Water, &c.

Anti-emetics.—Arrest vomiting. Examples :—Creasote, Dilute Hydrocyanic Acid, Chloroform, Chloral, Lime Water, &c.

Anthelmintics.—Destroy and expel worms from the alimentary canal. Examples :—Santonin, Male Fern, Turpentine, Gamboge, Common Salt, &c.

Anhidrotics.—Check perspiration. Examples :—Tannic Acid, Oxide of Zinc (internally). Sponging the body with cool, tepid, or hot Water, or with solutions of Dilute Acetic Acid, Sulphuric Acid, or Tannic Acid.

Antidotes.—Medicines which counteract the injurious influences of poisons.

Antiperiodics.—Drugs which interrupt periodical attacks of disease. Example :—Quinine, in neuralgia.

Antipyretics (Febrifuges).—Reduce high temperatures. Examples :—Quinine, Salicin, Phenazone, Phenacetin, Aconite, Alcohol, &c.

Antiseptics.—Prevent putrefaction by arresting the growth of, or destroying organic substances, and render inert the chemical activity of certain materials which give rise to fermentation and decomposition. When they destroy microbes and disease germs, they are called *germicides*. Examples :—Perchloride of Mercury, Carbolic Acid, Boracic Acid, Peroxide of Hydrogen, Thymol, Creasote, Iodoform, Eucalyptus, Permanganate of Potassium, Oil of Cloves, Iodine, &c. What one might call a mechanical germicide is a burr on a dental engine. Thorough reaming of root canals, goes a long way towards killing micrococci.

Antispasmodics.—Alleviate muscular spasm, and compose irregular action of the nervous systems. Examples :—Asafoetida, Camphor, Valerian, Bromide of Potassium.

Aperients.—See **Cathartics**.

Astringents.—Medicines which coagulate albuminous fluids, and cause contraction of blood-vessels and the tissues to which they are applied. They also check excessive discharges and prevent the growth of granulation tissue, and are generally divided into

vegetable and *mineral*, the astringency of the former being due to Tannic Acid, whilst the latter diminish the alkalinity of the blood, and increase its coagulability. Examples:—Of the *vegetable* astringents, Tannic and Gallic Acids, Rhatany, Catechu, Matico. Of the *mineral* astringents, Iron, Alum, and the Mineral Acids.

Bleaching Agents.—Drugs which are employed in dentistry, to remove the discolouration in a “dead” tooth. Examples:—Chlorinated Lime, Peroxide of Hydrogen, Oxalic Acid, Sulphite of Soda, and Boracic Acid.

Carminatives.—Substances which dispel flatulence, and allay pain and spasm of the stomach and intestine. Examples:—All Aromatics, Asafoetida, Camphor, Ether, &c.

Cathartics.—Medicines which cause an increased action of the bowels. They can be briefly described under three headings:—

1. *Aperients* or *Laxatives* cause a slightly increased peristaltic action, and softening of the fæces, and so mildly evacuate the bowels. Examples: Figs, Prunes, Cassia, Magnesia, Compound Liquorice Powder, Olive Oil, Sulphate of Magnesium.

2. *Purgatives.*—Cause, in addition to the above, a greatly increased peristaltic action of the intestines, and more copious evacuations. Examples:—Aloes, Jalap, Rhubarb, Senna, Castor Oil, &c.

3. *Drastics.*—These are still more violent in their action, and generally cause not only the neighbouring viscera to secrete a greater quantity of their respective fluids, but a copious elimination of the fluids from the intestinal glands. They are generally accompanied

with pain and griping. Under this heading would come such drugs as Calomel, Colocynth, Croton Oil, Podophyllin.

There are many other forms of *cathartics*, the action of which is unnecessary to mention in a work of this kind, and in addition they have several adjuncts, such as Nux Vomica, Strychnine, and Sulphate of Iron, which act by giving tone and contractile power to the intestine.

Caustics.—Substances which are capable of destroying living tissues, and which destroy or arrest the activity of organic poisons, those producing an eschar, being termed *Escharotics*. Examples:—The Mineral Acids, Caustic Alkalies, Chloride of Zinc, Strong Solution of Ammonium, Arsenic, Nitrate of Silver, &c.

Colouring Agents.—Substances employed to communicate their peculiar colour to pharmaceutical preparations. In dental practice, they are used for colouring tooth-powders. Examples:—Cochineal, Saffron, Rose Pink.

Counter-Irritants.—Substances which are applied to a part, to produce external irritation, in order to relieve pain or diseased action in another. They are divided into three varieties, according to the amount of irritation they set up, viz. rubefacients, vesicants, pustulants.

1. *Rubefacients.*—Agents which cause increased redness and heat to the parts to which they are applied. Examples:—Poultices, Mustard, Ammonia, Capsicum, Turpentine, &c.

2. *Vesicants (Epispastics, Blisters).*—Agents which act in a greater degree than rubefacients, and cause

inflammation followed by an effusion of serum beneath the cuticle. In children, whenever it is necessary to use a blister, it is advisable to apply it just long enough to redden the skin, and then complete the vesication with a poultice. In cases of neuralgia, a "flying" blister to the temple, cheek, or behind the ear, will often give relief, although if the neuralgia is dependent on toothache, the latter will remain, whilst the former disappears. Examples:—Cantharides, Ammonia (if long continued), Glacial Acetic Acid, Iodine, &c.

3. *Pustulants (Suppurants)*.—These act in a greater degree than the former, and when rubbed or painted on the skin, produce a crop of pimples. Examples:—Croton Oil, Tartar Emetic, Nitrate of Silver (in strong solution).

Demulcents.—Internal remedies which soothe and soften the mucous membrane of the alimentary canal. Examples:—Simple drinks, such as warm water, toast and water, barley-water, Gelatine, Isinglass, Syrups, &c.

Deodorizers.—Agents which absorb gases and destroy infectious and foetid odours. Examples:—Carbolic Acid, Creasote, Chloride of Lime, Permanganate of Potash, Charcoal, &c.

Desiccatives.—See **Absorbents**.

Detergents.—Cleanse ulcers and suppurating wounds, by acting either as stimulants or emollients. Examples:—Borax, Alum, Charcoal, &c.

Diaphoretics (Sudorifics).—Medicines which increase the amount of perspiration. Examples:—Jaborandi and its alkaloid Pilocarpine, Liquor Ammonii Ace-

tatis, Spiritus *Ætheris Nitrosi*, Dover's powder, Antimony.

Disinfectants.—Agents which destroy, or remove the causes of infection. Examples:—Chlorine, Chloride of Lime, Permanganate of Potash, Charcoal, Creasote.

Diuretics.—Substances which act on the kidneys and cause an increased flow of urine. Examples:—Squills, Turpentine, Alcohol, Salts of Sodium, Potassium, Lithium, &c.

Emetics.—Medicines which excite vomiting. Examples:—Apomorphine, Ipecacuanha, Sulphate of Zinc, Sulphate of Copper, Carbonate of Ammonium, Antimony.

Emollients.—Local agents which relax soft tissues, allay irritation, protect sensitive surfaces, and relieve pain. Examples:—Warm poultices, bread and milk, mucilaginous drinks, such as barley-water and gruel, Glycerine, palatable Oils, Collodion, &c.

Errhines.—Substances which excite sneezing, and produce an increased secretion from the nose. Examples:—Ammonia, Ipecacuanha, Chlorine, Snuff, &c.

Escharotics.—Powerful caustics which produce an eschar. The most common use of these agents in Dentistry, is in the application of Arsenic to devitalise the pulp of a tooth (see Arsenic). Examples (see **Caustics**).

Expectorants.—Medicinal agents which not only increase the amount of expectoration in the air passages and lungs, but also modify its characters, whereby it is more easily got rid of. Examples:—Carbonate of Ammonium, Squills, Aromatics, Ipecacuanha, Iodide of Potassium, Benzoin, &c.

Febrifuges.—See **Antipyretics**.

Germicides.—See **Antiseptics**.

Hæmatinics.—Medicines which increase the number of the red corpuscles, and hæmatin of the blood. Examples :—The different preparations of Iron.

Hæmostatics.—Substances which arrest both external and internal hæmorrhage. Examples :—Iron, Ergot, Alum, Gallic and Tannic Acids, Matico, &c.

Hypnotics.—See **Narcotics**.

Laxatives.—See **Cathartics**.

Narcotics.—Medicines which act on the nervous system ; when they induce sleep, they are called *Hypnotics* or *Soporifics* ; if used to relieve pain they are called *Anodynes*. Patients very quickly become habituated to their use, therefore it will be found necessary to *gradually* increase the dose, to maintain the first effect. Examples :—Opium and its preparations, Chloral, Sulphonal, Bromide of Potassium, &c.

Nervines.—Medicines which cure, relieve, or alter diseases of the nervous system. Examples :—Quinine, Phosphorus, Arsenic, Iron, &c.

Obtundents.—Agents which deaden pain. In dentistry, the term is generally applied to those drugs which relieve the pain of sensitive dentine. Examples :—Cocaine, Carbolic Acid, Chloride of Zinc, Oil of Cloves, Tincture of Aconite, Creasote, Nitrate of Silver (for back teeth), Arsenic (for shallow cavities).

Purgatives.—See **Cathartics**.

Refrigerants.—Medicines which diminish fever and allay thirst. Examples :—Solution of Acetate of Ammonium, Sweet Spirit of Nitre, Acetic Acid, Citric Acid, Nitrate of Potash, Water, &c.

Rubefacients.—See **Counter-Irritants.**

Sedatives.—Medicines which directly depress or have a soothing effect on different parts of the system. Examples :—Digitalis, Aconite, Bromide of Potassium, Tartarated Antimony, &c.

Sialogogues.—Medicines which excite an increased flow of the saliva and buccal mucus. Examples :—Pellitory Root, Horse Radish, Calomel, Tobacco, Iodide of Mercury, Iodide of Potassium, &c.

Soporifics.—See **Narcotics.**

Stimulants.—Medicines capable of exciting the vital powers. Examples :—Alcohol, Ammonia, Ether, Camphor, Aromatics, &c.

Stomachics.—Medicines which aid the functions of the stomach. Examples :—Bicarbonate of Sodium, the Dilute Mineral Acids, Aromatic Bitters, Nux Vomica, Pepsin, Dilute Hydrocyanic Acid, &c.

Styptics.—Local remedies for arresting hæmorrhage.

They may conveniently be divided into two varieties, *mechanical* and *chemical*. The former act either as a plug, or by detaining the blood in their meshes, whilst the latter coagulate the blood and cause constriction of the surrounding tissues. Examples :—(*mechanical*) Lint, Cotton Wool, Spider's Web, Plaster of Paris; (*chemical*) Ice, Persalts of Iron, Carbolic Acid, Tannic Acid, Nitrate of Silver, &c. Matico leaves act both ways.

Sudorifics.—See **Diaphoretics.**

Tonics.—Medicines which give tone and vigor to various parts of the system. Those which act by interrupting periodical attacks of diseases, such as

neuralgia, are called *antiperiodics*. Examples:—
The preparations of Iron, Cod Liver Oil, Quinine,
Arsenic, Strychnine, Chloride of Ammonium, &c.

Vesicants.—See **Counter-irritants**.

POSOLOGICAL TABLE

Acids, Dilute Mineral Acids (Hydro- bromic, Hydrochloric, Nitric, Phosphoric, Aromatic Sulphuric, Sulphuric)	. . . . .	10 — 30 min.
Acidum Aceticum Dilutum.	. . . . .	1 — 2 fl. dr. diluted.
„ Arseniosum	. . . . .	$\frac{1}{60}$ — $\frac{1}{12}$ gr.
„ Benzoicum .	. . . . .	10 — 15 „
„ Boricum .	. . . . .	5 — 30 „
„ Carbolicum .	. . . . .	1 — 3 „
„ „ Liquefactum	. . . . .	1 — 4 min.
„ Gallicum .	. . . . .	2 — 10 gr.
„ Hydrocyanicum Dilutum	. . . . .	2 — 5 min.
„ Nitro-hydrochloricum Di- lutum . . . . .	. . . . .	5 — 20 „
„ Salicylicum .	. . . . .	5 — 30 gr.
„ Tannicum .	. . . . .	2 — 10 „
Æther . . . . .	. . . . .	20 — 60 min.
Alumen . . . . .	. . . . .	10 — 20 gr.
Ammonia Salts, Benzoate, Bromide, Phosphate . . . . .	. . . . .	5 — 20 „
Ammonii Carbonas (as a stimulant)	. . . . .	3 — 10 „
„ „ (as an emetic) .	. . . . .	30 „ freely diluted.

Ammonii Chloridum . . .	5 — 30 gr.
Amyl Nitris (by inhalation) . . .	2 — 5 min.
„ „ (by mixture) . . .	$\frac{1}{2}$ — 1 „
Antifebrin . . .	1 — 4 gr.
Antipyrine . . .	3 — 20 „
Argenti Nitras . . .	$\frac{1}{6}$ — $\frac{1}{3}$ „
„ Oxidum . . .	$\frac{1}{2}$ — 2 „
Beberinae Sulphas . . .	1 — 10 „
Bismuthi Carbonas, Oxidum, Sub- nitras . . . each	5 — 20 „
Borax . . .	5 — 40 „
Butyl-Chloral Hydras . . .	5 — 15 „
Calcii Carbonas Præcipitata . . .	10 — 60 „
„ Chloridum . . .	3 — 10 „
„ Hypophosphis . . .	1 — 5 „
Calx Sulphurata . . .	$\frac{1}{10}$ — 1 „
Camphora . . .	1 — 10 „
Capsicum . . .	$\frac{1}{2}$ — 1 „
Carbo Animalis Purificatus . . .	20 — 60 „
„ „ „ (as an antidote) . . .	$\frac{1}{2}$ — 2 oz.
Chloral Hydras . . .	5 — 20 gr.
Cocainæ Hydrochloras . . .	$\frac{1}{5}$ — $\frac{1}{2}$ „
Creasotum . . .	1 — 3 min.
Creta præparata . . .	10 — 60 gr.
Cupri Sulphas (astringent) . . .	$\frac{1}{4}$ — 2 „
„ „ (emetic) . . .	5 — 10 „
Ergota . . .	20 — 30 „
Ergotinum . . .	2 — 5 „
Extractum Ergotæ Liquidum . . .	15 — 30 min.
„ Gelsemii Alcholicum . . .	$\frac{1}{2}$ — 2 gr.
Ferri-Peroxidum Hydratum . . .	5 — 30 „
Gelsemine . . .	$\frac{1}{60}$ — $\frac{1}{20}$ „

Gelsemium	5 — 30 gr.
Glycerinum	1 — 2 fl. dr.
Hydrargyri Perchloridum	$\frac{1}{16}$ — $\frac{1}{8}$ gr.
„ Subchloridum	$\frac{1}{2}$ — 5 „
Hydrargyrum cum Cretâ	3 — 8 „
Infusa, all officinal Infusions	1 fl. oz.
except Infusum Digitalis	2 — 4 fl. dr.
Injectio Apomorphinæ Hypodermica	3 — 8 min.
„ Cocainæ Hydrochloratis	2 — 10 „
„ Ergotini Hypodermica	2 — 8 „
„ Morphinæ Hypodermica	1 — 3 „
	or more with care.
Iodoform	$\frac{1}{2}$ — 3 gr.
Ipecacuanha (emetic)	15 — 30 „
„ (expectorant)	$\frac{1}{2}$ — 2 „
Liquor Ammoniaë	10 — 20 min.
„ Atropinæ Sulphatis	1 — 4 „
„ Calcii Chloridi	15 — 60 „
„ Calcis	1 — 4 fl. oz.
„ „ Saccharatus	15 — 60 min.
„ Ferri Perchloridi	10 — 30 „
„ Hydrargyri Perchloridi	$\frac{1}{2}$ — 2 fl. dr.
„ Morphinæ Acetatis	10 — 60 min.
„ „ Hydrochloratis	10 — 60 „
„ Potassæ	15 — 60 „
„ Potassii Permanganatis	2 — 4 fl. dr.
Magnesia Levis	} 10 — 60 gr.
„ Ponderosa	
Magnesii Carbonas Levis	
„ „ Ponderosa	}
„ Sulphas	
Menthol	$\frac{1}{2}$ — 2 gr.

Misturæ	all	.	.	.	$\frac{1}{2}$ — 2 fl. oz.
Morphinæ	Acetas,	Hydrochloras,			
Sulphas	.	.	.	.	$\frac{1}{8}$ — $\frac{1}{2}$ gr.
Olea (essential)	.	.	.	.	1 — 4 min.
Oleum Crotonis	.	.	.	.	$\frac{1}{3}$ — 1 „
„	Morrhuaë	.	.	.	1 — 8 fl. dr.
„	Olivæ	.	.	.	1 — 8 „
„	Phosphoratum	.	.	.	1 — 4 min.
„	Ricini	.	.	.	1 — 8 fl. dr.
„	Terebinthinæ	.	.	.	10 — 30 min.
Opium	.	.	.	.	$\frac{1}{2}$ — 2 gr.
Paraldehydum	.	.	.	.	30 — 90 min.
Pepsin	.	.	.	.	2 — 5 gr.
Phenacetinum	.	.	.	.	5 — 10 „
Phenazonum	.	.	.	.	3 — 20 „
Phosphorus	.	.	.	.	$\frac{1}{200}$ — $\frac{1}{30}$ „

Pilulæ.—The dose of the officinal pills is from 5 to 10 grains, with the following exceptions, viz. :—
 Pilulæ Ferri Iodidi, Hydrargyri, Phosphori, Plumbi cum Opio, and Saponis Composita. These may be given in doses of 2 to 5 gr.

Plumbi Acetas	.	.	.	.	1 — 4 „
Potash Salts.—	The Bicarbonate,				
	Bromide, Carbonate, Chlorate,				
	Iodide, and Nitrate of Potassium				5 — 30 „
Potassii Permanganas	.	.	.	.	1 — 5 „
Pulvis Cretæ Aromaticus	.	.	.	.	10 — 60 „
„	„	„	cum Opio	.	10 — 40 „
„	Glycyrrhizæ Compositus	.	.	.	30 — 60 „
„	Ipecacuanhæ Compositus	.	.	.	5 — 15 „

Pulvis Tragacanthæ Compositus	.	20 — 60	gr.
Quininæ, Hydrochloras, Sulphas	.	1 — 10	„
Sodii Biboras	.	10 — 60	„
„ Bicarbonas	.	10 — 60	„
„ Bromidum	.	10 — 30	„
„ Salicylas	.	10 — 30	„
Spiritus all	.	$\frac{1}{2}$ — 1	fl. dr.
Sulphur	.	10 — 60	gr.
Syrupi all	.	$\frac{1}{2}$ — 1	dr.
Thymol	.	$\frac{1}{2}$ — 2	gr.
Tincturæ	.	$\frac{1}{2}$ — 1	dr.

Except—

Tinctura Aconiti	.	1 — 5	min.
„ Belladonnæ	.	5 — 20	„
„ Cannabis Indicæ	.	5 — 20	„
„ Capsici	.	2 — 10	„
„ Chloroformiet Mor-			
phinae	.	5 — 10	„
„ Digitalis	.	10 — 30	„
„ Ferri Perchloridi	.	10 — 30	„
„ Gelsemii	.	5 — 20	„
„ Iodi	.	5 — 20	„
„ Lobeliæ Ætherea	.	10 — 30	„
„ Nucis Vomicæ	.	5 — 20	„
„ Opii	.	5 — 30	„
Trochisci	.	1 — 3 or 4	
Vinum Antimoniale	.	5 — 60	min.
„ Ferri	.	1 — 4	fl. dr.
„ Ipecacuanhæ (emetic)	.	3 — 6	„
„ „ (expectorant)	.	5 — 40	min.
Zinci Chloridum	.	$\frac{1}{2}$ — 1	gr.
„ Oxidum	.	1 — 10	„

Zinci Sulphas (as a tonic) .	. 1 — 3 gr.
„ „ (as an emetic)	. 10 — 30 „

POSOLOGICAL TABLE FOR CHILDREN

For a child—

Under 1 year old give $\frac{1}{15}$ to $\frac{1}{12}$ of the dose for an adult.

„ 2 years „	$\frac{1}{8}$	„ „
„ 3 „ „	$\frac{1}{6}$	„ „
„ 4 „ „	$\frac{1}{4}$	„ „
„ 7 „ „	$\frac{1}{3}$	„ „
„ 12 „ „	$\frac{1}{2}$	„ „

From this age the dose is gradually increased till the patient reaches adult life, when the full dose can be given.

To Prepare Effervescing Draughts

17 grains of Citric Acid, or 18 grains of Tartaric Acid, or $\frac{1}{2}$ a fluid ounce of fresh lemon juice	Neutralise	$\left\{ \begin{array}{l} 25 \text{ grains Potass. Bicarb.} \\ 20 \text{ grains Sodii Bicarb.} \\ 15 \text{ grains Ammon. Carb.} \\ 13 \text{ grains Magnes. Carb.} \end{array} \right.$
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TABLE showing the proportion of active ingredients contained in some important preparations

Vinum Antimoniale .	. 1 gr. in $\frac{1}{2}$ fl. oz.
Injectio Ergotini Hypodermica	1 gr. in 3 min.
„ Morphinae Hypodermica .	. 1 gr. in 10 min.

Liquor Arsenicalis, Morphinæ	
Acetatis, Morphinæ Hydro-	
chloratis	1 in 100.
Liquor Morphinæ Bimeconatis	5½ gr. to 1 oz.
	= 1¼ per cent.
Pilula Plumbi cum Opio	1 part in 8 nearly
Pulvis Cretæ Aromaticus cum	
Opio	1 „ 40
„ Ipecacuanhæ Composi-	
tus	1 „ 10
Tinctura Opii	1 gr. in 14½ min.
„ „ Ammoniata	1 gr. in 96 „
Oleum Phosphoratum	1 per cent.
Pilula Phosphori	3 gr. contains $\frac{1}{30}$.

SOME OF THE FORMS IN WHICH MEDICINAL SUBSTANCES ARE EMPLOYED

Alkaloids.—Are the active principles of drugs. Their distinctive mark as regards nomenclature is the termination “ine.”

Cachets and Capsules.—These are agreeable forms of administering nauseous drugs, the former being made of wafer-paper of various sizes, in the shape of watch-glasses, which cohere on moistening their margins. They should be dipped in water immediately before swallowing. The latter are short tubes made of gelatine.

Cataplasms.—Are soft macerated preparations applied externally.

Decoctions.—Are solutions made by boiling vegetable substances in water.

Dentifrices.—Are mixtures of powders and other substances used for cleaning teeth. They should always consist of antiseptic and alkaline substances, in addition to other ingredients.

Emulsions.—Preparations which contain substances that are sparingly soluble in water, such as oils, resins, &c., and are suspended in mucilage, yolk of egg, &c.

Enemata.—Liquid preparations for injection *per rectum* (see page 8).

Extracts.—Preparations obtained by evaporating either the expressed juice of fresh plants, or the soluble constituents of dried drugs.

Fomentations.—Preparations applied to different parts of the body by means of a sponge, flannel, or soft cloth.

Gargles.—Liquid preparations for washing the mouth and throat. In the author's opinion, these should be called "mouth-washes," as in the large majority of cases, when they are used to gargle the throat, the drug or drugs seldom get beyond the anterior pillars of the fauces. It is much better to use a throat brush or an inhalation, when a drug is required to act on any part beyond these structures.

Glycerites.—Are solutions of medicinal substances in Glycerine. They are generally called "Glycerines," but the termination "ine" should be applied only to alkaloids. The official Glycerites, or according to the British Pharmacopœia, "Glycerines," are—

Glycerinum Acidi Carbolici.

„ „ Gallici.

Glycerinum Acidi Tannici.

„	Aluminis.
„	Amyli.
„	Boracis.
„	Plumbi Subacetatis.
„	Tragacanthæ.

Infusions.—Are preparations obtained by pouring hot or cold water upon vegetable substances, for the purpose of extracting their medicinal properties. Those which contain more than one active ingredient are called Compound Infusions.

Inhalations.—Preparations employed for their local effect on the mouth, nose, throat, and chest. They are often useful in producing the constitutional effects of a drug.

Insufflations.—Are the application of various substances to the nasal cavities, throat, ear, and open surfaces, by means of an insufflator.

Liniments.—Liquid preparations applied externally, by means of friction. One exception is the Iodine Liniment, which, unless united with some oily substance, is best used as a “paint,” otherwise vesication will occur.

Lozenges.—Are dried tablets of refined sugar and Gum Acacia, with one or more active ingredients.

Mixtures.—Are fluid preparations containing several ingredients administered by the mouth.

Mouth-Washes.—Are liquid preparations for use in the oral cavity. They are, as a rule, of an antiseptic character, and contain, in addition, either an astringent, a sedative, or a refrigerant, according to the state of the mouth.

Mucilages.—Are solutions of colloid substances in water.

Ointments.—Preparations for local use, which are composed of wax, lard, or resin, with solid or liquid ingredients.

Pills.—Are masses of medicinal agents of a spherical or globular shape. They vary very much in size, and are now usually coated to aid their deglutition.

Plasters.—Are applications spread on cloth, leather, &c., which, at the ordinary temperature of the body, adhere to the part to which they are applied.

Powders.—Are dry substances in minute particles. When of a nauseous nature, they should be given in “cachets” or “capsules.”

Spirits.—Are solutions of colourless substances, or oils in Rectified Spirit. Some are prepared in a special manner, and are then called *complex spirits*.

Stearoptenes.—Are the solid constituents of volatile oils.

Syrups.—Fluid preparations containing a large amount of sugar.

Tabloids.—Are small flat preparations, made from drugs, and Sugar of Milk, which have been minutely subdivided, admixed, and compressed. The term is protected.

Tinctures.—Are solutions of active substances in Rectified or Proof Spirit.

Wines.—Are solutions of drugs in Sherry, or Orange wine.

INORGANIC SUBSTANCES

INORGANIC CHEMISTRY

INORGANIC SUBSTANCES

ACIDUM ACETICUM

ACETIC ACID

Formula.— $\text{HC}_2\text{H}_3\text{O}_2$.

Source.—It is prepared from wood, by destructive distillation and purification.

Characters.—A colourless liquid with a pungent odour and strong acid reaction; sp. gr. 1.044. It occurs in three grades of strength. The *Glacial Acetic Acid* which is three times as strong as the ordinary acid, and this latter is eight times stronger than the Dilute Acetic Acid. Vinegar is an impure form of the latter, derived from Alcohol.

Pharmacology.—It is an astringent, diuretic, stimulant, refrigerant, vesicant, and caustic.

General Therapeutics.—Used externally to destroy corns and warts. As a refrigerant, a very dilute solution sponged on the skin in cases of fever, will frequently reduce the temperature.

Dental Therapeutics.—*As a Local Stimulant.*—In cases of cancrum oris and ulcers of the mouth, the application of Dilute Acetic Acid, with a camel's-hair brush, is at times of great service. As a gargle for

inflamed conditions of the mouth and fauces, the following prescription is most useful :

Acetic Acid	.	.	.	2 drachms.
Chloride of Ammonium	.	.	.	3 drachms.
Honey	.	.	.	1½ ounces.
Water	.	.	.	12 ounces.

To be used frequently as a mouth-wash.

As a Caustic.—It is applied in the form of Glacial Acetic Acid to fungoid growths of the gum and pulp.

Dose.—Of the dilute acid 1 fl. dr. to 2 fl. drs.

Antidotes.—Large doses of Soap and Water, Lime Water, and Magnesia. The Stomach-pump should *not* be used.

ACIDUM ARSENIOSUM

ARSENIOUS ACID

Formula.— As_2O_3 .

Synonyms.—White Arsenic, Arsenious Oxide.

Source.—It is obtained by roasting arsenical ores and purifying by sublimation.

Characters.—It is seen either in the form of a heavy white powder, or in porcelain-like masses stratified in appearance, according to the different opacity of its layers. It has no odour, scarcely any taste, but merely a faint sweetish impression, and is therefore liable to be mistaken for some more innocent substance.

Preparation.—Liquor Arsenicalis, “Fowler’s Solution.”

Pharmacology.—It is an irritant, caustic, escharotic, antiseptic, devitalising agent, antiperiodic, alterative,

and tonic. The continued application of a strong arsenical compound has a *destructive* effect, which is not simply a chemical one like that of acids, and is not exerted on the dead subject, but is produced by interference with the nutritive processes of the parts to which it is applied, causing a condensation and mummifying of tissue, rather than an actual destruction. From its great antiseptic powers it is used in the dissecting room for injecting dead bodies.

It is fatal to many of the lower forms of animal life, but does not check fermentation (Murrell).

Its action on the dental pulp is to cause hyperæmia, followed by dilatation of the blood-vessels, which have a tendency to thrombosis, and this eventually leads to gangrene of the pulp. Neither the connective-tissue fibres, nor the odontoblasts are changed, but the connective-tissue cells increase in size, and the axis cylinder of the nerve elements here and there disappear. Being a crystalloid, it is liable to permeate the dentine and cementum, or pass into the collateral circulation and so set up periostitis, with death of the peridental membrane, and even necrosis, not only of the alveolus, but of the neighbouring teeth.

General Therapeutics.—*Externally*, it is used for various skin diseases, and as an application to cancers. *Internally*, it is given in cases of chorea, diabetes, ague, dyspepsia, rheumatism, and neuralgia, particularly in those who have been subject to ague.

Dental Therapeutics.—Arsenic is used by dentists for three effects:

1st. To destroy the pulps of teeth.

2nd. As an obtundent of sensitive dentine.

3rd. As an alterative.

As a Devitalising Agent.—When using Arsenic for this purpose, several precautions are necessary, and very careful manipulation is needed to ensure success. The following directions should always be carried out :

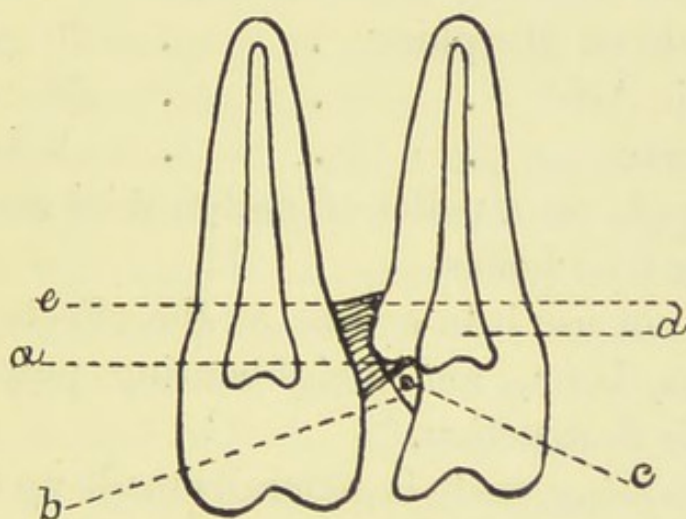
(a) Apply the rubber dam. This not only keeps the cavity dry, but prevents the Arsenic from coming in contact with the gum, an event which would cause sloughing of that tissue, even if more serious effects did not occur.

(b) Carefully dry the cavity with cotton-wool or bibulous paper, and afterwards (if the patient can bear it) with a hot-air syringe, and remove all softened dentine.

(c) If the exposure be small, enlarge it with a *sharp* excavator, as Arsenic applied to a small exposure, acts as an irritant, produces severe inflammation (or increases that which already exists), and causes excruciating pain, on account of the pulp squeezing through the small opening, and becoming constricted.

(d) Apply the Arsenic (about $\frac{1}{16}$ gr.) on a piece of cotton wool or cardboard, which has previously been dipped in Oil of Cloves or Eucalyptus, to the exposure. This should be capped with a metal cap to prevent pressure, and the cavity filled with temporary Gutta Percha, or if on a masticating surface with an osteo filling. A solution of Gum Mastich or Gum Sandarac should never be used as a temporary filling on the top of Arsenic, as it is not only liable to get under the cap and prevent its action, but the dressing might partially come away when taking off the rubber

dam, and in addition to this it is not such a safe filling. Plaster of Paris and Wax are sometimes used to retain the Arsenic in position, but the two first-mentioned materials are best. Should the cavity extend to, or below the gum margin place a rim of Gutta Percha along the cervical margin first. This will allow the Arsenic to be applied without shifting, when the temporary stopping is inserted. The following diagram, copied by permission from Messrs. Morton Smale and Colyer's work on 'Diseases and Injuries of the Teeth,' fully illustrates this.



(a) Gutta percha ; (b) metal cap covering dressing ; (c) dressing of Arsenic ; (d) pulp chamber ; (e) line indicating margin of gum.

Elastic caps are now made to keep temporary fillings *in situ*, in cavities of isolated teeth, where there is danger of their not being retained.

In addition to the powdered Arsenic by itself being used, there are different preparations such as Baldock's nerve paste, Arsenical nerve fibre, &c., which have (or should have) the same effect. The latter consists of Arsenic, Creasote, Tannic Acid, and Opium, incorpo-

rated in fibre. The application should be left in from twenty-four to forty-eight hours.

(e) When using Oil of Cloves, Eucalyptus, or any other fluid as a means of taking up the Arsenic, an excess of either should not be used, as it is liable to be squeezed out, and with it some of the Arsenic.

(f) It should not be used in young children unless the root of the tooth is fully formed, as in destroying the pulp of a growing tooth its growth is stopped.

(g) Should a pulp be acutely inflamed, apply first of all either Cocaine or the following mixture to relieve the pain before using the Arsenic :

Acetate of Morphine . . .	20 grains.
Tannic Acid . . .	30 „
Creasote . . .	2 drachms.

Mix. Apply on a pellet of cotton wool and leave in for twenty-four hours.

(h) Do not use it in excess, as the effects spread to periosteum, bone, and neighbouring pulps, and so cause their destruction.

A devitalising paste is generally made up as follows :

Arsenious Acid . . .	10 grains.
Acetate of Morphine . . .	10 „

Creasote.—Sufficient quantity to make a paste.

Occasionally it will be found that several applications of Arsenic will fail to produce devitalisation, and the resistance offered to the influence of the drug may be due to several causes. There may be a granulated protective covering, which has formed over the surface of the exposed portion, defending it from the action of the Arsenic. Another cause may be an extraordinary vital power in the pulp of a patient

who probably would not be so susceptible to the action of Arsenic as the majority of people are, when administered by the mouth. In such cases, the difficulty is overcome either by first applying an obtundent (Cocaine), and then scraping off the granulated surface, or pricking the pulp with a sharp instrument, which has previously been dipped in Arsenic, or administering an anæsthetic and clearing out contents of pulp cavity and canals, with a burr on the dental engine.

After its application, it will frequently be found that a small portion of the nerve at the end of a canal is still alive. In such cases the application for a few days, of a Carbolic Acid solution (1 : 20) will complete the action of the Arsenic.

As an Obtundent.—It allays the pain of sensitive dentine, but should only be used in very *shallow* cavities, as it is capable of permeating through a considerable thickness of dentine, the result of which would be death of the pulp. If ever used for this purpose, it should only be allowed to remain in the cavity (which must be thoroughly sealed up) about two or three hours, and then every particle carefully removed.

As an Alterative and Antiperiodic.—Given internally, it frequently relieves neuralgia where Quinine has failed. When given for this or any other complaint, it should always be taken directly *after* meals, for if taken on an empty stomach it may act as an irritant poison.

Dose.— $\frac{1}{60}$ to $\frac{1}{12}$ grain. Of the Liquor Arsenicalis, 2 to 8 minims.

Antidotes.—Moist Peroxide of Iron, Animal Char-

coal, emetics, stomach-pump, stimulants, and artificial respiration.

A detailed description of the chemical and physiological action of Arsenic will be found in the 'Transactions of the International Medical Congress, Dental Section, 1881,' also in the 'Dental Record' of February, 1882.

ACIDUM BORICUM

BORIC ACID

Formula.— H_3BO_3 .

Synonym.—Boracic Acid.

Source.—It is made by the action of Sulphuric Acid on Borax.

Characters.—Colourless pearly plates, without odour, and of a slightly bitter taste.

Pharmacology.—It is an antiseptic, germicide, and bleaching agent. As a surgical dressing it is most valuable, as it produces little if any irritation to the parts to which it is applied, lessens suppuration, and prevents decomposition.

General Therapeutics.—It is greatly used as a surgical dressing for burns, wounds, and ulcers.

Dental Therapeutics.—*As an Antiseptic.*—It is employed as a mouth-wash in cases of the different ulcerations of the oral cavity, and necrosis of the jaws, in the strength of 20 grains to 1 ounce of Water. In the latter case, if the patient is unable to open the mouth, it should be well syringed with the solution, and the

same applies to cases of fracture. It is also an ingredient of dentifrices.

As a Bleaching Agent.—In combination with Sulphite of Soda it is used for bleaching dead teeth, the mixture being composed of ten parts of Sulphite of Soda to seven of Boric Acid, which should be thoroughly ground together in a warm dry mortar to a fine powder, preserved in an air-tight stoppered bottle, and kept in a dry place (Dr E. C. Kirk). In using this, the rubber dam must be applied and the apical foramen closed, and half the length of the root filled with Gutta Percha. Then pack the powder into the cavity, and allow just one drop of water from a drop tube to fall upon it, and seal with Gutta Percha. The action of the water is to liberate Sulphurous Acid Gas, which is a powerful bleaching agent. It should remain in the cavity two or three days, and two, if not three, applications are necessary.

Dose.—5 to 30 grains.

ACID CHROMICUM

CHROMIC ACID

Formula.— CrO_3 .

Synonym.—Chromic Anhydride.

Source.—Made by dissolving Bichromate of Potassium in Sulphuric Acid and Water; decanting from the Acid Sulphate of Potassium; heating the liquor with more Sulphuric Acid and Water; cooling and crystallising.

Characters.—It occurs in the form of crimson needles, which are very deliquescent, inodorous, corrosive, and soluble in Water. If mixed with Glycerine or Alcohol, an explosion may occur, therefore these substances should be added drop by drop when combined.

Pharmacology.—It is an escharotic, bleaching agent, obtundent, deodorant, and disinfectant. Great care must be taken to limit its action to the diseased parts, on account of its power of penetrating tissues.

General Therapeutics.—Employed chiefly for its escharotic properties.

Dental Therapeutics.—*As an Escharotic.*—It is frequently applied, and with success, to small growths on the gum, warts on the tongue, and fungoid growths of the pulp. The strength to be used is one of the acid to four of water, the parts around being carefully protected with strips of adhesive plaster, and a glass rod, or a wire made of gold or platinum, used for its application.

As an Obtundent.—It can be used for the relief of sensitive dentine, but is in no way superior to Cocaine, Chloride of Zinc, or Carbolic Acid. For psoriasis and syphilitic affections of the tongue, a solution of the strength of 1 in 40, is most serviceable for relieving the pain of passing food, which must in such cases be of a simple nature, and condiments and all irritating substances avoided. It should be painted over the affected parts with a camel's-hair brush before meals.

As a Bleaching Agent.—It can be used for this purpose, the same care being taken as with Chlorinated Lime, Oxalic Acid, &c.

Other Dental Uses.—It is used in Dental Microscopy as a *fixing* and *hardening* reagent; in various strengths for decalcifying hard tissues, and as an $\frac{1}{8}$ per cent. solution, as a staining reagent for showing the peripheral nerves in a fresh pulp.

Dose.—It is not given internally.

Antidotes.—Emetics, Chalk and Milk, stomach-pump, and demulcent drinks.

ACIDUM HYDROCHLORICUM

HYDROCHLORIC ACID

Formula.—HCl.

Synonyms.—Muriatic Acid, “spirits of salt.”

Source.—Obtained by the action of Sulphuric Acid upon Chloride of Sodium, and solution of the fumes in Water.

Characters.—When pure, it is a transparent colourless fluid; when impure, it has a yellow colour. It emits a dense white vapour, with a pungent odour and corrosive taste. Sp. gr. 1.16.

Preparations.—Acidum Hydrochloricum Dilutum, Acidum Nitro-hydrochloricum Dilutum.

Pharmacology.—Applied externally, the strong acid is a powerful caustic and escharotic. It does not penetrate so deeply as Nitric and Sulphuric Acids, but produces a white stain, and this part afterwards sloughs.

Internally it is refrigerant, tonic, and astringent in its action. In moderate doses, the dilute acid has two

main effects. 1. It augments the acidity of the gastric juice, and so improves its digestive power. 2. After absorption, it gives rise to extra formation of Chloride of Sodium.

General Therapeutics.—It is given in cases of atonic dyspepsia, most of the fevers, &c., and is applied locally in the various diseases of the throat, such as diphtheria and ulcerated sore throat.

Dental Therapeutics.—*As a Local Agent.*—Dilute Hydrochloric Acid combined with equal parts of Glycerine, is useful in inflammation and ulceration of the mucous membrane of the mouth, and when applied to any sloughing parts, will arrest the necrotic changes, and induce what is known as a healthy inflammation. In mercurial stomatitis, the following prescription can be used with advantage as a mouth-wash.

Dilute Hydrochloric Acid	.	1 ounce.
Chlorate of Potassium	.	2 drachms.
Glycerine	.	1 ounce.
Rose Water to	.	12 ounces.

To be used as a gargle.

When being taken internally for any length of time, it should be sucked through a straw, or plain or alkalised water should be used to rinse the mouth out, to prevent the acid injuring the enamel of the teeth.

Other Dental Uses.—It is used as a “pickle” for gold and platinum, zinc and borax being dissolved by it. It is used as a decalcifying agent in Dental Microscopy, in the strength of a 10 per cent. solution.

Dose.—Of the dilute acid, 10 to 30 minims.

Antidotes.—Soap and Water, Chalk, Magnesia, white of egg, oil. The stomach-pump cannot be used with

safety. If the larynx is involved, tracheotomy may have to be performed.

ACIDUM NITRICUM

NITRIC ACID

Formula.— HNO_3 .

Synonym.—Aqua fortis.

Source.—Obtained by the action of Sulphuric Acid on Nitrate of Potassium, or Sodium.

Characters.—When pure, it is a colourless, intensely acid, fuming liquid. Sp. gr. 1.42.

Preparations.—Acidum Nitricum Dilutum, Acidum Nitro-hydrochloricum Dilutum.

Pharmacology.—It is a powerful caustic and escharotic, and leaves a permanent stain on the skin. It is also an alterative, tonic, and refrigerant, and if its administration is prolonged it causes salivation.

General Therapeutics.—Externally, the strong acid is used in hospital gangrene, phagedenic ulcerations, syphilitic sore throat, malignant ulcers, &c. Internally, it is given in the dilute form for dyspepsia, in the different fevers, and hepatic disorders. The same precautions as with HCl must be taken, when prescribing this drug, to avoid injury to the teeth.

Dental Therapeutics.—*As a Caustic.*—It is employed in cases of cancrum oris, and malignant ulcers of the mouth, the constitution at the same time being supported by the internal administration of Quinine, acids, port wine, and generous diet.

As a Devitalising Agent.—It has also been used to

destroy the pulps of teeth, but such a method is to be deprecated, as it will not only cause disintegration of the dentine, but its use for this purpose is at once brutal and unscientific.

Other Dental Uses.—When one part of strong Nitric Acid is mixed with three parts of strong Hydrochloric Acid, Aqua Regia is formed. This dissolves gold. A one per cent. solution of the Acid is used as a decalcifying agent in Dental Microscopy.

Doses.—Acidum Nitricum Dilutum, 10 to 30 minims, Acidum Nitro-hydrochloricum Dilutum, 5 to 30 minims.

Antidotes.—Same as Hydrochloric Acid.

ACIDUM PHOSPHORICUM CONCENTRATUM

CONCENTRATED PHOSPHORIC ACID

Formula.— H_3PO_4 .

Source.—Made by boiling Phosphorus with Nitric Acid and Water; evaporating till coloured vapours cease, and diluting with Water.

Characters.—A colourless syrupy liquid with a sour, yet not unpleasant taste.

Preparation.—Acidum Phosphoricum Dilutum.

Pharmacology.—The dilute acid is a nervine tonic and refrigerant. In large doses, it is an irritant poison.

General Therapeutics.—It is employed as a local application in cases of caries and necrosis of bones. Given internally in scrofula, and to allay the thirst of diabetes and fevers.

Dental Therapeutics.—The concentrated acid is the chief constituent of the liquid portion of the oxyphosphate fillings, but it is sometimes combined with Phosphate of Alumina.

It will occasionally relieve the pain of sensitive dentine.

Dose.—Of the dilute acid, 10 to 30 minims.

ACIDUM SULPHURICUM

SULPHURIC ACID

Formula.— H_2SO_4 .

Synonym.—Oil of Vitriol.

Source.—Obtained by the combustion of Sulphur; the oxidation by nitrous fumes, and hydration by aqueous vapour of the resulting Sulphurous Acid gas.

Characters.—It is a dense, oily, colourless liquid, with a corrosive action. Sp. gr. 1.843.

Preparations.—Acidum Sulphuricum Dilutum, Acidum Sulphuricum Aromaticum.

Pharmacology.—It is a caustic, escharotic, internal astringent, tonic, refrigerant, and solvent of bone.

General Therapeutics.—Externally, it is used for caries and necrosis of bone. In these cases, the patient's constitution is undermined by the discharge which takes place during the time of the separation of the dead from the living bone. The application of equal parts of Sulphuric Acid and Water, however, causes a more speedy removal of dying bone, or more rapid

separation of dead portions, and in cases of caries, a quicker destruction of carious particles.

Internally, it is used in cases of hæmorrhage of a passive character, combined with Gallic Acid (see Gallic Acid), diarrhœa, and in lead poisoning when combined with Sulphate of Magnesium.

Dental Therapeutics.—*As a Caustic.*—The strong acid is employed in cases of malignant ulcers, cancrum oris, and gangrene, in the form of a paste made by mixing it with powdered Sulphate of Zinc in the following proportions :

Sulphate of Zinc $\frac{1}{2}$ ounce.

Sulphuric Acid, sufficient quantity to make a paste.

As a Hæmostatic.—It is useful in alveolar hæmorrhage combined with Ergot (see Ergot).

Other Dental Uses.—It is used to cleanse metal plates preparatory to and after soldering, for which purpose it is generally diluted with a little water (about $\frac{1}{3}$), its action being greater when it is “boiled up.” When diluting it, pour the acid *slowly* into the water, not the reverse, as it is dangerous. In combination with Nitric Acid, it is used to reduce hemp paper to Pyroxylin in the manufacture of Celluloid.

Dose.—Of the dilute acid, 5 to 30 minims.

Antidotes.—Same as Acidum Hydrochloricum.

ACIDUM SULPHURICUM AROMATICUM

AROMATIC SULPHURIC ACID

This preparation should really be described under the heading of “Acidum Sulphuricum,” but as it is of

important use to the Dental Surgeon, it was thought best to emphasise it by a separate description.

Source.—By macerating and digesting—

Sulphuric Acid	3 ounces.
Rectified Spirit	2 pints.
Cinnamon (in powder)	2 ounces.
Ginger (in powder)	1 $\frac{1}{4}$ „

Characters.—It is a reddish-brown liquid, with an aromatic odour. Sp. gr. 0.911.

Pharmacology.—It is a tonic, astringent, local stimulant, and solvent of bone.

Dental Therapeutics.—*As a Solvent.*—Its chief use is for the treatment of pyorrhœa alveolaris. In these cases, even after very careful scaling, small particles of tartar are left on the roots of the teeth, and in addition to this the alveolar borders are often in a carious condition, and the gums in a chronic state of inflammation. All these conditions can be improved, if not cured, by using the following prescription :

Aromatic Sulphuric Acid	3 drachms.
Tincture of Capsicum	10 drops.
Water	2 drachms.

Into this, a small pledget of cotton wool should be dipped, and placed in the pockets between the gum and teeth, and allowed to remain there for about half an hour, when it should be removed, and the parts syringed with warm water. The Tincture of Capsicum stimulates the gum to healthy action. This mode of treatment should always be assisted with antiseptic methods.

Dose.—5 to 20 minims.

Antidotes.—Same as Acidum Hydrochloricum.

ALUMEN

ALUM

Formula.— $\text{Al}_2\text{SO}_4, \text{K}_2\text{SO}_4, 24\text{H}_2\text{O}$ (Potassium Alum), or $\text{Al}_2\text{SO}_4, (\text{NH}_4)_2\text{SO}_4, 24\text{H}_2\text{O}$ (Ammonium Alum).

Source.—Made from Alum Schist (Silicate of Aluminium and Sulphide of Iron) by roasting and exposure to air; lixiviating; crystallising out the Ferrous Sulphate; adding either Sulphate of Potassium or Sulphate of Ammonium to the liquor, and crystallising.

Characters.—Colourless octahedral crystals, or irregular lumps, which have an acid, sweetish, astringent taste. Soluble in 1 in 10 of cold, 10 in 8 boiling Water. When heated, it dissolves in its water of crystallisation, and when this has been driven off, Alum remains as a dry white spongy mass, *Alumen Exsiccatum*, dried alum.

Pharmacology.—It is an astringent, styptic, and in large doses, an emetic. The dried Alum is also a caustic. When taken into the mouth, it causes dryness of all the parts, and an abundant flow of saliva, coagulating the albumen of this fluid and the buccal mucus, in white membranous flakes.

General Therapeutics.—Used externally, for arresting hæmorrhage and chronic inflammatory discharges from mucous membranes. Internally, it is given for diarrhœa, chronic dysentery, and in large doses for constipation and lead colic.

Dental Therapeutics.—*As an Astringent and Styptic.*—It is used to arrest alveolar hæmorrhage after tooth

extraction, but is inferior to Iron and Tannin. In simple stomatitis, congested conditions of the mouth, and sponginess of the gums, Alum mouth-washes in the strength of from 5 to 10 grains to one ounce of water afford great relief.

After the extraction of many teeth or stumps, Alum mouth-washes will considerably help to "harden" the gums. A simple prescription in such cases is one teaspoonful of powdered Alum in a tumbler of water. Alum should not be used as an ingredient of dentifrices, on account of the Sulphuric Acid it contains.

Other Dental Uses.—For "dipping" models. The model should be first dried, and then boiled in a strong solution for half an hour.

Dose.—10 to 20 grains.

AMMONIUM COMPOUNDS

The compounds of Ammonium are very numerous. Those used in dentistry are the Carbonate, Chloride, and Valerianate.

Ammonii Carbonas.—*Carbonate of Ammonium.*— $N_3H_{11}C_2O_5$.

Synonym.—Ammoniae Sesquicarbonas.

Source.—It is obtained by subliming a mixture of Chloride of Ammonium and Chalk.

Characters.—White transparent crystalline masses with a pungent odour. When exposed to the air, it loses its odour, and crumbles into an opaque mass of Bicarbonate of Ammonium.

Pharmacology.—The vapour of Carbonate of Am-

monium (commonly called "smelling salts") is stimulant and slightly irritant.

It is an antacid, emetic (by virtue of its reflex action on the vomiting centre), diaphoretic, and stimulant expectorant. It quickens the heart's action and capillary circulation, which is more marked in the weak than the healthy.

General Therapeutics.—Externally, it is used as a volatile or smelling salts in syncope, hysteria, and asphyxia; internally, for chronic bronchitis, pneumonia, asthma, &c.

Dental Therapeutics.—*As a Stimulant.*—Given internally, in cases of cancrum oris in doses of 5 grains, gradually increased to 10, every two or three hours, during the use of Nitric Acid as a local application. In these cases, it is best combined with bark in the following proportions:

Carbonate of Ammonium	. . .	60 grains.
Spirits of Chloroform	. . .	2 drachms.
Decoction of Cinchona	. . .	6 ounces.
Two table-spoonfuls to be taken every three hours.		

Doses.—3 to 10 grains or more; as an emetic, 30 grains well diluted.

SPIRITUS AMMONIÆ AROMATICUS

AROMATIC SPIRITS OF AMMONIA

Synonym.—Sal Volatile.

Source.—Made from Carbonate of Ammonium and a strong solution of Ammonia, with Oil of Nutmeg, Oil of Lemon, Rectified Spirit, and Water.

Pharmacology.—It is one of the most diffusible stimulants known, and is a safer restorative than Alcohol. It is also an antacid and carminative.

General and Dental Therapeutics.—Given for syncope after operations. It counteracts the depressing effects of Iodide and Bromide of Potassium when these drugs are administered, and where the use of Alcohol as a stimulant is prohibited.

It acts as an antacid when applied to the necks of sensitive teeth, erosion cavities, &c., and will frequently relieve pain in these cases.

Dose.— $\frac{1}{2}$ fluid drachm to 1 fluid drachm.

AMMONII CHLORIDUM

CHLORIDE OF AMMONIA

Formula.— NH_4Cl .

Synonyms.—Sal Ammoniac, Muriate of Ammonia.

Source.—Prepared from Gas Liquor by adding Hydrochloric Acid to neutralisation, evaporating the liquid, and purifying the crystals by sublimation.

Characters.—It occurs in pieces of the hemispherical cakes in which it is sublimed. Is of a translucent fibrous appearance, with a pungent saline taste. It is inodorous, and in its ordinary form difficult to powder.

Solubility 1 in 4 of water. Soluble in Rectified Spirit.

Pharmacology.—It is a local refrigerant (its solution producing cold), alterative, nervine stimulant, and expectorant. In large doses, it is an irritant poison.

General Therapeutics.—It is employed in cases of chronic bronchitis, in the form of a vapour, to facilitate expectoration, pneumonia, headache, and rheumatism.

Dental Therapeutics.—*As an Alterative.*—Its great use is for the relief of neuralgia, and in such cases the following can be prescribed :

Chloride of Ammonium . . .	3 drachms.
Tincture of Lemons . . .	3 „
Spirit of Chloroform . . .	1½ „
Water to . . .	6 ounces.

Order two tablespoonfuls to be taken every three hours. If relief is not obtained after four doses, its use should be discontinued, as it is not likely to have any effect after this.

Other Dental Uses.—Used in the workroom to restore Zinc which has become deteriorated from long use, also as a flux for refining gold.

Dose.—5 to 20 grains.

LIQUOR AMMONIÆ FORTIOR

STRONG SOLUTION OF AMMONIA

Source.—Made by heating a mixture of Chloride of Ammonium and Slaked Lime, and collecting the gaseous product in water.

Characters.—It is a colourless liquid with a characteristic odour, and strong alkaline reaction. Sp. gr. 0·891.

Pharmacology.—It is a powerful local stimulant, rubefacient, and vesicant. When applied to the

mucous membrane of the nose as an inhalation, care must be taken that the solution is not too strong, as cases of fatal bronchitis have been set up through an overpowering effect of this drug. It is three times as strong as the Solution of Ammonia—Liquor Ammoniaë.

General and Dental Therapeutics.—Used *with care* as a restorative in cases of syncope from any cause. Locally applied it is an antidote in cases of venomous snake-bites. Vesication by it is better avoided. It is seldom given internally.

Antidotes.—It may be given in mistake for Sal Volatile, in which case give vinegar, lemon juice, or Acetic Acid freely diluted, and demulcent drinks.

AQUA

W A T E R

Formula.— H_2O .

Description.—Pure natural water is a limpid, colourless liquid, free from taste or odour. When evaporated, it should leave no residue.

Aqua Destillata.—Distilled water. This should always be used for preparing medicines, but seldom is.

Pharmacology.—The action of water *per se* depends upon the way in which it is used, and its temperature. Externally applied, it is first of all a cleansing agent, not only to the skin but to wounds; it either raises or lowers the temperature of the body; it relieves inflam-

mation; it is an anodyne, hæmostatic, diuretic, and diaphoretic. Warm water is also an emetic. Ice acts as a local anæsthetic.

General and Dental Therapeutics.—For the relief of inflammation it is applied in the form of hot fomentations, either alone or as a basis of other substances, such as Linseed meal, or inflamed parts may be steamed over boiling water. In cases of abscess, hot fomentations expedite the pointing and relieve tension and pain. Cold water may be used to ulcers, wounds, and contusions, either as a dressing or by means of irrigation. In the form of Ice, it can be sucked in cases of sore throat to reduce local inflammation, and in certain febrile conditions, to lower the general temperature, and allay thirst.

As a Hæmostatic.—The local application of Ice will frequently restrain hæmorrhage from small blood-vessels. Slight alveolar hæmorrhage is frequently aggravated by the patient continuing to use warm water, which the dental surgeon has given him to rinse his mouth after an extraction. In such cases, by stopping the warm water, removing the clots, and directing the patient to suck Ice, the bleeding will cease. In more severe cases, the alternate use of cold and hot water (120° F.) will frequently act as a hæmostatic, but the socket will invariably have to be plugged as well. Ordinary warm water is also used in dentistry by means of a syringe, for washing out cavities and canals of teeth. Boiling water is a most effective sterilising agent for instruments. A copper utensil should be used, with a jet of gas underneath to keep the water boiling.

For a description of Hot, Cold, and Sitz Baths, Cold Douche, Wet Pack, &c., the reader is referred to works on Pharmacology and Therapeutics.

ARGENTI NITRAS

NITRATE OF SILVER

Formula.— AgNO_3 .

Synonym.—Lunar Caustic.

Source.—It is prepared by crystallisation from a solution of pure Silver in Dilute Nitric Acid. When fused and solidified in moulds, it constitutes the small pencils known as Lunar Caustic.

Characters.—It crystallises in rhombic crystals, which are colourless, the action of light causing them 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, as chlorides decompose it.

Pharmacology.—It is a caustic, styptic, astringent, and obtundent of sensitive dentine. When applied to the skin, moistened Nitrate of Silver combines with the albuminous materials, and leaves a white stain, which soon darkens on exposure to the light or air, on account of its reduction to metallic silver by Sulphuretted Hydrogen. Its caustic effects are limited to the area of application. “On suppurating surfaces, the solid Nitrate combines with the purulent secretions and forms a greyish layer; stimulates the healing process, and causes some burning pain and

redness near the part. When the superficial eschar falls (in from twenty-four to forty-eight hours), fresh and healthy granulations are usually found on the wound. Its action does not extend deeply, because of the albuminous pellicle which is formed; therefore the so-called 'caustic' effect of Nitrate of Silver must be distinguished from that of destructive agents such as Potash or Acids, for it is produced by coagulating and hardening the tissues rather than by destroying them" (Phillips). When employed internally, great care must be taken in its administration, as it causes a blue discolouration of the skin (due to the deposit of the metal in a very finely divided state), if continued for any length of time. During its use, occasional purgatives should be administered to promote its elimination, and it should not be given for longer periods than a month or six weeks.

As an obtundent of sensitive dentine, its good effects are obtained by virtue of it being a coagulant of albumen, and its power of penetrating the dentinal tubes. The great objection to its use is the discolouration it causes.

General Therapeutics.—It is given internally for dyspepsia, chronic diarrhœa, epilepsy, chorea, asthma, and whooping-cough. Used externally in ophthalmia, diphtheria, erysipelas, hydrophobia, &c. In the treatment of thrush, where milder measures, such as Borax, have failed, the patches can be touched with Nitrate of Silver, in the strength of 5 to 10 grains to one ounce of Water.

Dental Therapeutics.—*As a Styptic.*—It is used to arrest alveolar hæmorrhage after the extraction of

teeth, but is not a reliable agent, as the clot formed by it is soluble in an excess of albumen.

As an Obtundent.—It is used to relieve the pain of sensitive dentine, but its use for this purpose must be restricted to back teeth, on account of the discolouration it causes. When applied to distal or awkward cavities at the back of the mouth, it should be fused on platinum wire. If the stick itself is used, it is liable to break, and a piece drop down the patient's throat, and so cause serious symptoms. Such a case has been recorded, but the prompt administration of common salt arrested what might have been a fatal case.

As an Astringent.—For the different forms of stomatitis, and in any inflamed conditions of the oral cavity, it is used as a mouth-wash in the strength of from 1 to 30 grains to one ounce of Distilled Water. For empyema of the Antrum, an injection, 2 to 5 grains to one ounce of Water, can be used.

As a Caustic.—It can be applied in the solid form to fungoid growths of the mouth, and to granulations due to necrosis of fractured alveolus, the same care being taken, as when applying it to sensitive dentine. Should the application in any of the above cases cause excessive pain, a solution of common salt should be used, or what is better still a previous application of *Nitrate* of Cocaine, *not* the Hydrochlorate, which is incompatible.

Other Dental Uses.—It is used in Dental Microscopy as a *staining* agent, chiefly to demonstrate the epithelial nature of Nasmyth's membrane.

Dose.— $\frac{1}{6}$ to $\frac{1}{3}$ grain in pill. This should not be made

with bread crumb as it contains common salt, which would decompose the Nitrate of Silver.

Antidotes.—Common salt (which forms an insoluble chloride), stomach-pump, emetics, white of egg. To remove recent stains from the cuticle, wash with a solution of common salt, and follow with a solution of Ammonia; for old stains, rub first with Tincture of Iodine, followed by Cyanide of Potassium.

CALCIUM

CALCIUM (Ca = 40)

The official salts and preparations of Calcium used by Dentists are as follows:—The Precipitated Carbonate, the Sulphide, Chlorinated Lime, the Hypophosphite, the Solution, and the Sulphate.

CALCII CARBONAS PRÆCIPITATA

PRECIPITATED CARBONATE OF CALCIUM

Formula.— CaCO_3 .

Synonym.—Precipitated Chalk.

Source.—Made by mixing boiling solutions of Chloride of Calcium and Carbonate of Sodium; washing and drying the precipitate.

Characters.—A white crystalline powder, insoluble in Water.

Dental Therapeutics.—Its chief dental use is as a

basis for different kinds of dentifrices, when it acts as an antacid and cleansing agent. It is also employed for polishing gold and amalgam fillings.

CALCII HYPOPHOSPHIS

HYPOPHOSPHITE OF CALCIUM

Formula.— $\text{Ca} (\text{Ph}_2\text{O}_2)_2$.

Source.—Made by heating Slaked Lime and Water with Phosphorus; purifying the liquid and crystallising.

Characters.—White pearly crystals, with a nauseous bitter taste. Soluble in 8 parts of Water; insoluble in Spirit.

Pharmacology.—It is a nervine tonic and alterative. This salt, together with those of Sodium and Potassium, is easily absorbed, and their influence on nutrition very great, especially on tissues like bone, cartilage, and the teeth. They are said to have a beneficial effect on the bones of children affected with rickets, on account of the salts of Calcium entering so largely into their composition; and as the dental tissues are normally supplied with such a big proportion of Phosphate of Lime, it is only reasonable to think that its internal administration will improve their condition when the Lime salts are deficient in quality. For the same and other reasons, the Hypophosphites can be given with advantage to pregnant women. Many authorities, however, deny that Lime Salts are of any use, when prescribed for these purposes.

Dental Therapeutics.—It should be given in the form of a syrup to young children, where there are evident signs of rickets, and after any of the exanthemata, when there is reason to think the permanent teeth, which are being developed, are likely to be affected. It can be ordered in the form of Fellows' Compound Syrup of Hypophosphites, or Parrish's food, and can be combined with Cod-liver Oil.

Dose.—1 to 5 grains. The Syrup can be given in teaspoonful doses in Water, or with a teaspoonful or more of Cod-liver Oil, according to the way in which the latter drug is assimilated, due regard being paid to the age of the patient.

CALX CHLORINATA

CHLORINATED LIME

Formula.— CaOCl_2 .

Synonym.—Chloride of Lime.

Source.—Made by passing Chlorine gas over Slaked Lime.

Characters.—It occurs as a whitish powder, or in lumps, and has an odour resembling Chlorine.

Pharmacology.—It is a local stimulant, deodoriser, disinfectant, antiseptic, and bleaching agent.

Dental Therapeutics.—*As a Bleaching Agent.*—It is of great value for restoring the colour of dead teeth. For this purpose the following conditions must be carried out:

(a) Obtain a good quality, and see that it is thoroughly dry.

(b) Apply the rubber dam, and after the cavity and canal (or canals) have been excavated and shaped, plug the apical foramen with a pledget of cotton wool, and fill the roots with Gutta Percha.

(c) Thoroughly dry the cavity.

(d) Use a wooden or ivory instrument, to convey the Lime to the cavity, *not* a steel one, as salts of Iron would be formed, which would rapidly discolour the teeth.

(e) Carefully seal the cavity with Gutta Percha, and leave the Lime in for two or three days.

Its power as a bleaching agent may be greatly assisted by mixing it with Acetic Acid, which liberates the Chlorine, and this product acts by taking up the hydrogen of Water and setting free nascent oxygen. An instrument should first be dipped into a weak solution and then into the Lime, and conveyed quickly to the cavity. As a rule it will be necessary to use one or two applications before the tooth is bleached, after which the cavity should be cleansed and an oxychloride filling inserted for a time.

As an Antiseptic and Disinfectant.—It is used in cancrum oris, ulcerations of the mouth, and to correct foetid breath. For these purposes, solutions of Chlorinated Lime, varying in strength from 10 grains to half a drachm, to one ounce of Distilled Water, may be used as a gargle or a lotion.

CALX SULPHURATA

SULPHURATED LIME

Formula.— CaS .

Synonyms.—Sulphide of Calcium, “Hepar Calcis,”
Liver of Lime.

Source.—Made by heating a mixture of Sulphate of Calcium and Wood Charcoal.

Characters.—A whitish powder with a strong odour of sulphuretted hydrogen.

Pharmacology.—It is an alterative and purgative. It checks inflammation and suppuration. If given early, it controls the inflammatory process, either aborting it, so that it does not go on to suppuration, or if this takes place, controlling and limiting its extent, promoting a more healthy formation, quicker evacuation, and more rapid subsequent healing (Phillips).

General Therapeutics.—It is of great use in cases of simple abscess, boils, carbuncles, quinsy, &c.

Dental Therapeutics.—It is given in cases of dental periostitis and alveolar abscess. As solutions of this drug do not keep, it is best to order it in form of a pill, in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain every two or three hours.

Dose.— $\frac{1}{10}$ to $\frac{1}{2}$ grain.

LIQUOR CALCIS

LIME WATER

Source.—Made by adding Distilled Water to freshly Slaked Lime, and the cleared fluid poured off.

Pharmacology.—It is an antacid, astringent, and desiccant.

Dental Therapeutics.—*As an Antacid.*—It is given to infants in the proportion of one part of Lime Water to two or three of milk (according to age), in cases of vomiting or irritability of the stomach, either from teething or improper feeding.

It is also useful as a gargle in those cases where the saliva is viscid and foetid, and the teeth soft in structure and sensitive.

Dose.— $\frac{1}{2}$ to 4 fluid ounces.

CALCII SULPHAS

SULPHATE OF CALCIUM

Synonym.—"Plaster of Paris."

Dental Uses.—In the surgery, it is used for taking plaster impressions of the mouth. The advantages claimed for it over other impression materials are—it causes no pressure on the gums and soft tissues, but copies both without displacing them, and is therefore most useful when taking an impression of a cleft palate. It is also said to shrink less.

Its disadvantages are—its disagreeable taste, the

difficulties that arise when there are undercuts, and the fact that when hard, a foreign body, in the shape of soap or oil must be smeared over it, to prevent the subsequent plaster model sticking to it.

For the way in which plaster impressions are taken, the author must refer the reader to works on Dental Mechanics, as a description would be out of place here.

It is occasionally used as a *mechanical* styptic in cases of hæmorrhage.

CARBO

CARBON (C = 12)

Synonym.—Charcoal.

Characters.—An elementary body found pure, or nearly so, in the diamond, plumbago, and anthracite, and is employed in medicine in the form of Charcoal, of which there are two varieties, Wood and Animal.

Carbo Ligni.—*Wood charcoal.*

Source.—Wood burnt without the access of air.

Characters.—Black brittle masses, retaining the form and texture of wood.

Pharmacology.—It is an antiseptic, antacid, deodorant, and carminative.

General Therapeutics.—It is of great benefit in cases of acidity of the stomach with flatulence, when taken pure, or in the form of biscuits. Employed locally, as a disinfectant and deodorant, to foul ulcers and cancers.

Dental Therapeutics.—It is used to correct the foetor of ulceration of the cheeks and face, also occasionally as an ingredient of tooth-powders; but its employment for this purpose is inadvisable, as it is said to cause recession of the gums, and a blue discolouration, not unlike that of lead poisoning.

Carbo Animalis.—*Animal Charcoal.*

Synonym.—Bone-black.

Source.—Obtained by exposing bones to a red heat, without the admission of air, and powdering the residue.

Preparation.—*Carbo Animalis Purificatus.* Purified Animal Charcoal.

Characters.—A greyish-black powder insoluble in Water.

Pharmacology.—It is a decolouriser, and antidote to vegetable poisons.

General Therapeutics.—Its great value is as an antidote in poisoning by Opium, Nux Vomica, Aconite, and other organic poisons. Half an ounce will neutralise 1 grain of Morphine or Strychnine.

Doses.—Of Wood Charcoal 20 to 60 grains or more.

Of Animal Charcoal 20 to 60 grains or more.

As an antidote, $\frac{1}{2}$ ounce repeatedly.

CUPRI SULPHAS

SULPHATE OF COPPER

Formula.— $\text{CuSO}_4, 5\text{H}_2\text{O}$.

Synonyms.—Blue vitriol, copperas, blue stone.

Source.—Made by heating Copper with Sulphuric

Acid, dissolving the soluble product in hot Water, evaporating and crystallising.

Characters.—Deep blue crystals with a strongly styptic and metallic taste.

Pharmacology.—It is a caustic, local stimulant, astringent, antiseptic, and rapid emetic. If it fails to induce vomiting, the stomach must be evacuated by some other means, as it is an irritant poison.

General Therapeutics.—Its great value is as an emetic, particularly in cases of narcotic poisoning. It is also an antidote in cases of Phosphorus poisoning; 3 grains should be given in Water every few minutes until vomiting occurs, when a free saline purgative should be administered. Applied locally, it is used as a caustic and local stimulant, and for touching granular lids, ulcers, wounds, &c.

Dental Therapeutics.—*As a stimulating astringent.*

In aphthous stomatitis, it can be applied to the white curdy deposits, either in the solid form, or as a strong solution, and will cause their removal. The raw surfaces beneath can then be treated with some less stringent remedies, such as Borax and Honey.

The same treatment can be followed in all cases of ulcerations of the mucous membrane of the mouth.

As a Caustic.—The crystal can be applied to fungoid growths of the gums, and to soft and spongy granulations.

As an Antiseptic.—It is of great use in cases of pyorrhœa alveolaris. For this purpose, it can be used after removal of the tartar, either dry or as a saturated solution. When used dry, pack some of the powdered crystal in the pockets or pouches of the

gum with non-metallic instruments, and leave them in for half an hour; they should then be carefully removed and the parts well syringed with warm water. If a saturated solution be used, take a piece of orange-wood, taper it to a thin edge, which should be roughened, and twist on a little cotton wool; dip this into the solution, and pass it into the pockets several times.

Other Dental Uses.—It is an ingredient of the Copper Amalgams, and although such fillings may shrink more than some silver alloys, and have less edge strength, yet their value as an antiseptic material is very great.

Doses.— $\frac{1}{4}$ to 2 grains. As an emetic, 5 to 10 grains.

Antidotes.—White of egg, to be followed by use of stomach-pump and emetics.

HYDRARGYRUM

MERCURY (Hg = 200)

Synonym.—Quicksilver.

Source.—It is found either pure, or combined with the Sulphide, from which it is obtained by roasting or distilling with Lime.

Characters.—It is a fluid metal of a nearly silver-white colour and a high degree of lustre. When pure, it has neither taste nor smell, readily oxidises on exposure to the air, but does not tarnish. Should tarnishing occur, it implies the presence of other metals, such as Lead, Zinc, or Bismuth. It is sus-

ceptible of such division that it may be squeezed into minute globules through chamois leather.

Preparations :

Hydrargyrum cum Cretâ, "Grey Powder;"

Emplastrum Hydrargyri;

Emplastrum Ammoniaci cum Hydrargyro;

Pilula Hydrargyri, "Blue Pill;"

Unguentum Hydrargyri, "Blue Ointment."

Pharmacology.—Metallic Mercury, when taken into the stomach, does not have any effect, and passes out of the body unchanged. It is, however, used as an *alterative* in the form of the "Blue Ointment," and as an *alterative* and *purgative* in the form of "Grey Powder" and "Blue Pill." It is also a sialogogue.

General Therapeutics.—It is of great use in infantile syphilis, when applied in the form of the Unguentum aided by friction. The Hydrargyrum cum Cretâ is administered as a purgative in some of the diseases of children, and $\frac{1}{3}$ of a grain every hour or two hours will also cure the diarrhœa of infancy. It is also employed in the secondary stages of syphilis, combined with Opium, to prevent purgative action. Mercury and its preparations are contra-indicated in patients of a weak and anæmic condition, unless strictly antisyphilitic measures are necessary. Infants, on the other hand, bear it well, but from a dental point of view, it should be remembered, its prolonged administration may produce very deleterious effects on the second dentition. Honeycombed or "Mercurial" teeth, as described by Mr Jonathan Hutchinson, may or may not be caused by the effects of Mercury, but due consideration must be given to

the fact that when this drug is being given for any of the exanthemata of infancy, the permanent teeth are being developed, and therefore the cause of their deformity, when erupted, must not *entirely* be put down to the effects of the drug, as they (the exanthemata) are known to affect all epithelial structures.

Dental Therapeutics.—It is used in dental practice as an ingredient of amalgam fillings, being combined for such purposes with Silver, Tin, Zinc, Copper, Palladium, Platinum, and Gold. It is also employed to assist in the removal of amalgam fillings, when several small holes should be drilled into the filling, and the Mercury conveyed to them on an amalgam carrier with roughened edges, to which the Mercury quickly attaches itself, as it (the carrier) has generally some small particles of old amalgam adherent to it. The Mercury should then be well rubbed into the holes with a small burnisher, and, after waiting a few minutes, the filling will soften and crumble out easily.

Dose.—Hydrargyrum cum Cretâ 3 to 8 grains, according to age, and in smaller doses as mentioned above.

For symptoms of Mercurial poisoning, see page 88.

Preparations of Mercury.—Under the heading of “Hydrargyrum,” the author thinks it best to describe those Mercurials which are used by dentists, and the first of these is—

I. **Hydrargyrum Perchloridum.**—*Perchloride of Mercury.*

Formula.— HgCl_2 .

Synonyms.—Corrosive sublimate, Bichloride of Mercury.

Source.—It is made by triturating a mixture of Persulphate of Mercury and Chloride of Sodium with Black Oxide of Manganese, and subliming.

Preparations.—Liquor Hydrargyri Perchloridi, Lotio Hydrargyri Flava.

Characters.—It occurs in heavy white crystalline masses of prismatic crystals, and is of a styptic and metallic taste. Soluble in 1 in 20 of Water, 1 in 5 of Alcohol, 1 in 6 of Ether.

Pharmacology.—It is an antiseptic, germicide, alterative, sialogogue, and irritant. It has a strong affinity for water, and thus robs bacteria of one element of their existence, viz. moisture. 1 part in 10,000 destroys micrococci and bacilli. 1 in 1000 destroys their spores.

General Therapeutics.—It is given internally in syphilis, both in the secondary and tertiary stages. In the latter case, it is best combined with Iodide of Potassium in the following proportions :

Solution of the Perchloride of

Mercury	.	.	.	1 ounce.
Iodide of Potassium	.	.	.	80 grains.
Water to	.	.	.	8 ounces.

Two tablespoonfuls to be taken three times daily. With this combination, a Biniodide of Mercury is formed in the system, which is a most powerful remedy.

It is much used as an antiseptic dressing in combination with cotton wool, &c. Also given internally in infantile diarrhoea with slimy stools, whether due to teething or not.

Dental Therapeutics.—*As an Antiseptic and Germi-*

cide.—It was introduced into dental practice for these purposes in the treatment of dead teeth, and the term “immediate” root filling has been chiefly applied when this drug is used. The mode of procedure is as follows :—First *apply the rubber dam*. Then excavate and shape the cavity, open up the pulp chamber, drill out the root canals, syringe them with warm water, and afterwards pump up Chloroform to remove any greasy material. In reaming the canals, great care must be taken to prevent septic material being forced through the apical foramen. They (the canals) should next be well dried with the hot-air syringe, and afterwards syringed out several times with 1 in 500 Alcoholic solution of the Perchloride. The *rationale* of this is that the hot air desiccates the organic particles, when they eagerly absorb the Alcoholic solution. Some fine strands of cotton wool should then be prepared on a Donaldson bristle, for carrying an oxychloride cement into the canals. Whilst this is being done, and the cement is being mixed, the solution is left soaking into the canals. This leaves their walls moist—a matter of some importance, for if wet, the oxychloride will penetrate more quickly than if dry. When the canals are filled, the remainder of the cavity can be finished with some suitable material.

This method has been advocated even in cases of acute abscess, but for obvious reasons is not very practicable.

For the “immediate” treatment of dead teeth, its advocates claim that it seldom causes any subsequent periostitis, fewer extractions and failures than that

with the dressing method, and it also saves the time of both operator and patient.

In teeth where the apical foramen is large, as in young children, the 1:500 solution should be used cautiously, whilst the 1:2000 can be used with impunity. Some advocate using it with Alcohol, others with Water, but the former has many advantages.

The strength of the solution to be used, varies from 1:200 to 1:2000 of Water or Alcohol. Weaker solutions than this are antiseptic, but will not kill germs.

A solution of 1:2000 can be used for dipping instruments into before applying to the mouth, also for the fingers of the operator, or in fact anything that may come in contact with the teeth or gums in any operations in the mouth.

In pyorrhœa alveolaris, the following can be used with advantage, after thorough scaling:

Perchloride of Mercury . . . 1 grain.

Peroxide of Hydrogen . . . 1 ounce.

Mix. Dip small pledgets of cotton wool into the solution, and swab out the pouches round the teeth.

In ulcerative stomatitis, by carefully touching the ulcerated spots with the 1:200 solution, great benefit may be derived.

As a mouth-wash, its use, strong enough to be of any advantage, is to be deprecated on account of its poisonous properties.

As an Alterative.—In infantile diarrhœa, whether due to teething or not, the following is a useful prescription:

Solution of the Perchloride of Mercury, 24 drops.

Dill Water 1 ounce.

To be made into a mixture. One teaspoonful to be given every three or four hours.

Other Dental Uses.—It is most useful as a *fixing* reagent in Dental Microscopy. Mr G. G. Champion uses a mixture of this drug and spirit as a *fixing* and *hardening* reagent for preparing specimens of the pulp.

Doses.— $\frac{1}{16}$ to $\frac{1}{8}$ grain. Of the liquor, $\frac{1}{2}$ to 2 drachms.

Antidotes.—See page 88.

II. The Sulphide of Mercury.— HgS , is employed in the manufacture of Dental Rubber. Cases of mercurial poisoning have been reported from wearing Rubber Dentures, also from Amalgam Fillings. In all probability, this would be due to a peculiar idiosyncrasy on the part of the patients, which rendered them unduly susceptible to the drug.

III. The Subchloride of Mercury.

Formula.— Hg_2Cl_2 .

Synonym.—Calomel.

Dental Therapeutics.—Is given as a *purgative* in infantile convulsions due to teething, in doses of $\frac{1}{2}$ to 2 grains, according to age. As there is some difficulty in administering powders to infants, it is best to take a piece of butter the size of a pea, roll it in the powder, and place it with the fingers at the back of the child's throat. Bromide of Potassium or Sodium should be given at the same time (see page 104).

SYMPTOMS OF MERCURIAL POISONING

The first indication is generally noticed by the gums becoming swollen, and assuming a dark red colour. This is followed by salivation, which becomes very profuse, tumefaction and redness of the gums, dyspepsia, and diarrhœa. These symptoms are accompanied and followed with foetid breath, swelling of the tongue, ulceration of the mouth, loosening of the teeth, and necrosis of the jaws. The patient gets pale and wastes away, a low febrile condition sets in, eczema mercuriale may occur, and various nervous phenomena, such as paralysis and mental disturbance, present themselves, and unless antidotes are administered and the drug stopped, death would occur.

Antidotes to Mercury and its Salts

Emetics, white of egg, the latter forming an insoluble Albuminate of Mercury ; stomach-pump.

In chronic cases, discontinue the use of Mercury and give Chlorate of Potassium, both internally and as a gargle. Mouth-washes of Permanganate of Potassium can also be used to correct the foetor of the breath.

When using a strong solution of the Perchloride without the rubber dam, and severe inflammation is set up, through its coming into contact with the soft tissues of the mouth, apply either a solution of Cocaine, or paint the parts with Tincture of Aconite, to relieve the pain.

HYDROGENII PEROXIDUM

PEROXIDE OF HYDROGEN

Formula.— H_2O_2 .

Synonyms.—Hydroxyl, Hydrogen Dioxide.

Source.—Obtained by treating Peroxide of Barium with dilute Sulphuric Acid, and filtering.

Characters.—It is a colourless, odourless liquid with a bitter taste. It easily decomposes, and should be kept in dark well-stoppered bottles. It is the chief constituent of "Sanitas." It may contain impurities in the shape of Hydrochloric and Sulphuric Acids.

Pharmacology.—It is an antiseptic, germicide, preventive of fermentation, and bleaching agent.

Its value as an antiseptic is due to the fact that it is a very unstable chemical compound, from which Oxygen is quickly liberated by contact with substances having an affinity for it. It therefore oxidises or destroys all micro-organisms and pus cells. It is a very active and harmless agent for sterilising putrid cavities and substances, differing from other drugs such as Perchloride of Mercury, Carbolic Acid, &c., in its action, as these drugs, although powerful antiseptics, may cause dangerous results from their caustic irritating properties if used in a concentrated form, whereas the Peroxide of Hydrogen possesses none.

Dental Therapeutics.—*As an Antiseptic and Germicide.*
—It is used in the treatment of dead teeth, one of its

advantages over other antiseptics being the evolution of gas which takes place whilst any putrescent matter remains in the canal or canals. For dead teeth with fistulous openings on the gum, it should be pumped up with a small syringe, and the cavity at once well plugged with Gutta Percha. As soon as the Peroxide comes in contact with the foetid pus, it will bubble out at the fistulous opening. It is very useful as a test of asepsis, after other antiseptics have been used.

In pyorrhœa alveolaris, the author considers it most useful combined with Perchloride of Mercury (see Perchloride of Mercury). Also as an after treatment, when Aromatic Sulphuric Acid has been used to dissolve away small particles of tartar and the carious margins of the alveolus. Here, as in other cases, the application of the Peroxide must be persevered with till effervescence ceases.

One may be quite sure of all instruments being aseptic, by dipping them in a small vessel containing the Peroxide. Should the slightest sign of bubbling occur, which is shown by a white streak or patch, it will be known they have not been properly cleansed.

As a Bleaching Agent.—It can be used to remove the discolouration of dead teeth by combining it with Chloride of Alumina. The rubber dam should be applied, the cavity well dried, and a small quantity of the Chloride of Alumina placed in position and moistened with Peroxide of Hydrogen, and allowed to remain a few minutes, when all should be washed out with a clear solution of Biborate of Sodium.

Stains on the teeth, especially those around the gum margin, are easily removed by means of small brushes

dipped in a mixture of powdered pumice and Peroxide of Hydrogen.

When using this drug to any great extent, the teeth should afterwards be well syringed with warm water, on account of its acid action (due to impurities) on the dental tissues.

IODUM

IODINE ($I = 127$)

Source.—It is obtained from kelp, the ashes of seaweed, and from the mineral Iodides and Iodates.

Characters.—Laminar crystals of a dark colour and lustre, which have a peculiar odour; sparingly soluble in Water, freely so in a solution of Iodide of Potassium, Chloride of Sodium, Ether, and Alcohol.

Preparations.—The Liniment, Tincture, Liquor, Unguentum, and Vapour. The liniment is the strongest, its strength being about 1 in 9, whilst the tincture is only 1 in 40.

Pharmacology.—It is a counter-irritant, vesicant, absorbent, antiseptic, disinfectant, and alterative. Taken internally, it may cause a condition known as "Iodism," symptoms of which are coryza, sneezing, headache, great depression, swelling and redness of the gums, hard and soft palate and fauces, foulness of the tongue, and an eruption on the skin.

General Therapeutics.—The tincture, liniment, and ointment, are used as stimulants and disinfectants to foul ulcers, and as counter-irritants in subacute and

chronic inflammation of joints, periosteum, glands, &c.; also in bronchocele, combined with the internal administration of Iodide of Potassium. In phthisis and most of the diseases of the lungs, the tincture or liniment is used with great benefit as a paint.

It is given internally in the form of Iodide of Potassium to obviate its irritant effects.

Dental Therapeutics.—*As a Counter-irritant and Vesicant.*—In dental periostitis, apply equal parts of the tincture or liniment, and tincture of Aconite (Fleming's) to the gum round the painful tooth or teeth, with a camel's-hair brush. The gum should be first dried, and after the application, the cheek should be held away from the part for a few seconds to prevent the drug being washed off by the saliva. In about the space of half a minute, it will be noticed that a metallic film has formed. The painting of these drugs on the gums will sometimes prevent the formation of an alveolar abscess. The tincture is useful for injections into cysts, abscesses, and ranulæ, when it acts as an "irritant." In cases of ranula, a very good method of effecting a cure, is to take up with a pair of forceps, the upper surface of the cyst and excise a large piece with a pair of curved scissors, evacuate the contents of the cyst, and plug with a strip of lint soaked in Tincture of Iodine. This should set up inflammation, cause granulation tissue to form, and bring about adhesion of the walls of the cavity.

As an Absorbent.—It is used for painting over enlarged glands, and for this purpose a colourless tincture is now made, either with Hyposulphite of Soda in the following proportions:—

Hyposulphite of Soda 40 ~~minims~~,

Tincture of Iodine 1 ounce ;

or by adding a strong solution of Ammonia to the Tincture of Iodine, and leaving it in a warm place until it has lost its colour, and afterwards diluting with Rectified Spirit. This colourless preparation, however, does not act nearly so strongly as the ordinary tincture.

In cases where the cheek is swollen from an alveolar abscess, resolution may happen, by painting a ring of the tincture round the swelling and covering the swelling itself with Flexile Collodion (see Collodion). In empyema of the Antrum of a chronic nature, an injection which is both irritant and antiseptic in its action is most serviceable, and the following can be used :

Tincture of Iodine 1 drachm.

Carbolic Acid 10 drops.

Water to 4 ounces.

As an Alterative.—In mercurial stomatitis, the following is a very useful prescription :

Tincture of Iodine . . . 3 to 4 drachms.

Iodide of Potassium . . . 15 to 30 grains.

Water to 10 ounces.

To be used as a mouth-wash.

On account of its affinity for Iron, it is used to loosen or remove the fragments of an instrument broken in a canal, when the removal of such is absolutely necessary. The advisability of doing this, however, is doubtful, as it weakens the shaft, so that it breaks again and leaves the head *in situ*. To remove stains of Iodine from the hands of the operator, or lips or

cheeks of the patient, use a solution of Hyposulphite of Soda (1 drachm to an ounce).

Antidotes.—Starch (which forms an insoluble Iodide of Starch), emetics, stomach-pump.

LIQUOR FERRI PERCHLORIDI FORTIOR

STRONG SOLUTION OF PERCHLORIDE OF IRON

Source.—Made by dissolving Iron Wire in Hydrochloric Acid and Water, adding Hydrochloric Acid, and pouring into Nitric Acid; evaporating and diluting.

Characters.—An orange-brown liquid with a strong styptic taste.

Preparations.—Liquor Ferri Perchloridi (1 of Strong Solution to 3 of Water), Tinctura Ferri Perchloridi (1 of Strong Solution to 1 of Spirit and 2 of Water).

Pharmacology.—Externally, it is a local styptic, astringent, and escharotic. It acts as a true styptic by causing a coagulum to form; at the same time it narrows both arteries and veins at the point of application, whilst the neighbouring vessels become dilated. The only objections to its use as a styptic are—(1) Its caustic action. (2) In cases of wounds, it prevents union by first intention. Its advantages, however, quite outweigh its disadvantages.

It causes discolouration of the teeth, more particularly when they are carious, the Sulphuretted Hydrogen precipitating the Iron (in the form of the Sulphide) from the solution in which it is held by the alkaline secretions of the mouth. Even when the teeth

are perfectly sound, discolouration may still occur from the presence of Tannic Acid in various articles of food, and in tea and other drinks, the precipitate in this case being a tannate and not a sulphide (Murrell). It has also antiseptic properties on account of its action on albumen. *Internally*, it is a hæmatinic, tonic, and alterative.

General Therapeutics.—It is administered for the various forms of hæmorrhage, whether from the nose, stomach, intestines, bladder, or uterus, but as a rule not from the lungs. As a hæmatinic, it is given in anæmia, and it is said to be a specific for erysipelas and diphtheria. In severe hæmorrhage from the tonsil, take a flat piece of wood and wrap the end of it with a piece of lint, dip it into a solution, and apply with pressure to the wound.

Dental Therapeutics.—*As a Styptic.*—For this purpose, this drug is to be preferred to any other in all cases of hæmorrhage after tooth extraction. In fact, the author has never found it fail when properly used. The following directions should always be carried out. First of all mop out the socket or sockets, clear away all clots, make the patient wash the mouth with cold water, and plug with a pledget of cotton wool. Allow this to remain for a few minutes, and on its removal, it will be seen (in cases of teeth with more than one root) which socket the hæmorrhage is coming from. This should be at once plugged with a pledget of cotton wool dipped in the strong solution of the Perchloride of Iron, on the top of which place a good pad, and tell the patient to bite firmly on it. (In young children, it is necessary at times to bind up

the jaw with a four-tailed bandage.) In all cases, a few general directions should be given to the patient, such as keeping quiet, remaining in an upright position, avoiding stimulants, and taking everything cold. This can be combined with the internal administration of the Solution of the Perchloride of Iron in 15-minim doses every two hours, especially when the blood on emerging from the socket shows no disposition to coagulate. The author prefers the Strong Solution, as its astringent effects are very great; but it is more acid than the ordinary solutions, and often acts as a caustic; consequently in certain cases it may be used with a little Water or Glycerine.

In simple cases, pledgets of cotton wool, which have been soaked in the solution and allowed to dry, will be found efficacious, and have little or no caustic effect. According to some authorities, the crystal of the Perchloride may be used as a styptic, but its caustic effect is so great that its use is to be deprecated.

As a Tonic and Hæmatinic.—In neuralgia due to anæmia, the Tincture is most advantageous in doses of 15 minims to 1 ounce of Water three times daily. In such cases, it relieves pain by its effect on the red corpuscles of the blood.

Other Dental Uses.—The Solution is one of the staining reagents in Dental Microscopy. Mr Howard Mummery has succeeded in tracing numerous fine fibres from the nerve bundles in the pulp, by this method.

Doses.—The Solution of the Perchloride of Iron,

10 to 30 minims; the Tincture of the Perchloride of Iron 10 to 30 minims.

MAGNESIUM

MAGNESIUM (Mg = 24)

The official salts of this drug which are used by dentists are the—

Magnesii Carbonas Ponderosa, *Heavy Carbonate of Magnesia*.

Magnesia Carbonas Levis, *Light Carbonate of Magnesia*.

Both of these are antacids, and are used for this purpose in dentistry as ingredients of dentifrices in the proportion of $\frac{1}{2}$ ounce, to 2 ounces of Precipitated Chalk. The light Magnesia is three and a half times as bulky as the heavy.

Magnesii Sulphas. *Sulphate of Magnesium* (Epsom Salts), is a simple useful purgative, and may safely be prescribed in cases of acute periostitis and alveolar abscess, in the form of "Haustus Albus" *i. e.*—

Sulphate of Magnesium	.	.	60 grs.,
Carbonate of Magnesium	.	.	10 grs.,
Peppermint Water to	.	.	1 ounce,

three times a day.

This should be accompanied with local treatment, and followed by tonics.

PHOSPHORUS

PHOSPHORUS (P = 31)

Source.—A non-metallic element obtained by treating bone-ash with Sulphuric Acid and Water; filtering and evaporating; heating with Charcoal; and distilling.

Characters.—It is obtained as a colourless oily fluid, which solidifies in cakes or rounded hollow pencils, and these are semi-transparent and wax-like when fresh, luminous in the dark, igniting in the air; insoluble in Water, soluble in Ether, Oils, and Naphtha. It must be kept under water.

Preparations.—Oleum Phosphoratum, Pilula Phosphori.

Pharmacology.—It is a local irritant and caustic, and is occasionally used as a "Moxa," *i. e.* a cone or cylinder of inflammable material. It is also a nervine tonic and stimulant. It has a special effect in causing inflammation of the periosteum and bone with necrosis of exposed parts, such as the maxillæ and teeth. It is only when the Phosphorus vapour directly reaches the periosteum or some raw vascular surface in immediate connection with the nutrition of bone, and when its application is prolonged under particular circumstances of temperature and oxidation, that its injurious effects are witnessed. Hence it is when there are carious teeth in the jaw, and the fumes of Phosphorus can act directly on the exposed pulp, or there is a wound in the mouth, that necrosis occurs. The disease

is more common in the lower jaw than the upper. It has also attacked the palate and frontal bones (Phillips). The manufacture of "safety" matches from red Phosphorus, has rendered the disease far less common than formerly.

General Therapeutics.—It is not much used by itself now, excepting in certain cases of typhoid fever, in some skin diseases, and for the relief of neuralgia. For the last, it is said to be a good remedy, even after other drugs, such as Gelsemium, &c., have failed.

Antidotes.—Sulphate of Copper, which forms not only a black phosphide which is non-poisonous, but also acts as an emetic. French Oil of Turpentine, which contains plenty of ozone, is also an antidote, converting Phosphorus into Hypophosphoric Acid.

Doses.— $\frac{1}{100}$ to $\frac{1}{10}$ gr.

Of the Oil 2 to 5 minims.

Of the Pill 2 to 4 grains.

PLUMBI ACETAS

ACETATE OF LEAD

Formula.— $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2, 3\text{H}_2\text{O}$.

Synonym.—Sugar of Lead.

Source.—Made by heating Oxide of Lead in Acetic Acid and Water, and crystallising.

Characters.—White, spongy-looking masses, made up of small interlaced acicular crystals. It has a sweetish acetous odour and a sweetish metallic taste. Soluble in Water.

Pharmacology.—Externally, it acts as a sedative, astringent, and hæmostatic. When applied to raw or abraded surfaces, it combines with the albumen, and covers the part with a protective coating. When taken into the mouth, it acts as an astringent on the mucous membrane.

Workers in lead are liable to be poisoned by it, but it may be introduced into the system, in many other modes far too numerous to mention here.

The symptoms of lead poisoning, to which the term “plumbism” or “saturnism” is applied, may be briefly described as follows:

1. Cachexia.
2. Blue line on the gums.
3. Colic, “Lead Colic,” “Painters’ Colic.”
4. Cramps.
5. Lead paralysis, or “Wrist-drop.”
6. Nervous Phenomena.

The symptom of most interest to the Dentist is the blue line on the gums. This is generally one of the first symptoms to appear and the last to disappear. It is observed on the gums round the necks of the teeth, but it may spread to the whole of the gums and the contiguous cheek. It is always more marked on the lower, than the upper gums, and in the incisor, more than the molar region. It is missing where there are no teeth, and is worse in those who do not clean their teeth. It is caused by the Sulphuretted Hydrogen, developed from the tartar of the teeth, penetrating the gums and forming a black Sulphide of Lead. It must be diagnosed from—

1. The discolouration of the margin of the gum

which takes place in those people who clean their teeth with Charcoal.

2. A deposit occurring in people exposed to carbon dust, such as miners.

3. A bluish line caused by a thin layer of black tartar.

4. Copper and Bismuth may also cause a blue line on the margins of the gums.

Dental Therapeutics.—*As a Hæmostatic.*—It can be given combined with Opium in the form of the Lead and Opium pill (3—5 grains), in severe cases of alveolar hæmorrhage, where the administration of Ergot is inadvisable. As, however, time would be required to dissolve the pill, and as in such cases urgency would be of the greatest importance, the following prescription would more likely meet the case:

Acetate of Lead . . .	5 grains.
Solution of the Acetate of Morphine	10 minims.
Dilute Acetic Acid . . .	15 „
Cinnamon Water to . . .	1 ounce.

To be taken every two hours until the hæmorrhage ceases. With both these remedies the local treatment would have to be persevered with.

The treatment of chronic lead poisoning, in so far as it affects the teeth, is to see that the patient takes extra care in cleaning them, and that the cause is removed.

POTASSIUM COMPOUNDS

POTASSA CAUSTICA

(Caustic Potash)

Formula.— KHO .

Synonyms.—Hydrate of Potash, Fused Potash.

Source.—From Liquor Potassæ, by boiling it down in a silver vessel, and pouring into moulds.

Characters.—White sticks of a transparent colour; very deliquescent, corrosive, and alkaline.

Pharmacology.—It is a caustic and escharotic, and when used as such, great care is necessary on account of its deep penetrating action. It is never given internally, as it is a corrosive poison. As a caustic, it has a deeper action than Nitrate of Silver.

General Therapeutics.—It is used to open abscesses, to arrest the sloughing of carbuncles, and as an application to malignant growths.

Dental Therapeutics.—It is used for polypi of the pulp and gums, though in the latter case it is better to have recourse to either the lancet, or Paquelin's cautery, after having previously applied Cocaine; no rough edges of enamel should be left at the cervical margin, and the filling should not overlap, or the growth is liable to recur from irritation. It is best used with a mixture of Lime (equal parts), when it is known as *Potassa cum Calce*. The addition of the Lime prevents, to a great extent, its deliquescent action.

Antidotes.—Emetics, large draughts of water mixed

with lemon juice or vinegar, olive oil, stomach-pump, demulcent drinks.

POTASSII BICARBONAS

(*Bicarbonate of Potassium*)

Formula.— KHCO_3 .

Source.—Made by saturating a strong aqueous solution of the Carbonate with Carbonic Acid Gas, and recrystallising the separated salts.

Characters.—Colourless, transparent right-rhombic crystals. Soluble in Water. Alkaline.

Pharmacology.—It is an antacid, diuretic, and antilithic.

General Therapeutics.—Given for gout, rheumatism, dyspepsia, &c.

Dental Therapeutics.—*As an Antacid.*—This drug and the Bicarbonate of Sodium have practically the same dental uses. A solution of either is useful as a mouth-wash, after using any of the Mineral Acids or Perchloride of Iron.

Dose.—10 to 40 grains.

POTASSII BROMIDUM

(*Bromide of Potassium*)

Formula.— KBr .

Source.—Obtained by adding Bromine in slight excess to Liquor Potassæ; heating with Charcoal; dissolving and crystallising.

Characters.—Colourless cubical crystals, resembling those of the Iodide of Potassium but smaller; no odour, taste saline. Soluble in Water, less so in Spirit.

Pharmacology.—It is a sedative and antispasmodic. In full doses the earliest effects are seen in the nervous system, and after a long course it sets up a condition known as *Bromism*, which is characterised by great depression, weakness of mind, headache, pallor, and unsteady gait. The “Bromides” generally, produce diminished reflex action of the soft palate, but no anæsthetic effects take place.

General Therapeutics.—Given for cerebral affections, such as epilepsy, hysteria, and convulsions; sea-sickness, insomnia, the vomiting of pregnancy, asthma, and migraine. It should not be forgotten that its prolonged administration is liable to produce a rash.

Dental Therapeutics.—*As a Sedative.*—In infantile convulsions of dental origin it is of great value. In such cases, it is best to give a purgative in the form of Calomel ($\frac{1}{2}$ to 2 grains) first. This should be followed by—

Bromide of Potassium	.	24 to 40 grains.
Simple Syrup	.	30 drops.
Dill Water to	.	1 ounce.

One teaspoonful every three or four hours. In addition, local treatment in the form of ice, or evaporating lotions to the head, and keeping the extremities and body warm, must be carried out.

Bromide of Potassium will at times relieve neuralgia, if the patient can rest, in which case it is best combined with Chloral Hydrate in doses of 15 or 20 grains of both.

By painting the pharynx and soft palate with a strong solution, it diminishes sensation, but its use for this purpose has been almost entirely superseded by Cocaine.

Dose.—5 to 30 grains.

POTASSII CHLORAS

(*Chlorate of Potassium*)

Formula.— KClO_3 .

Source.—Made by passing Chlorine gas through a solution of Carbonate of Potassium and Slaked Lime, boiling, filtering, and evaporating to crystallisation.

Characters.—Pearly white, hard crystalline plates, which have a cooling taste. Sparingly soluble in cold Water. Explodes when rubbed with Sulphur or Sulphides.

Pharmacology.—It is a refrigerant, alterative, and diuretic. It increases the flow of saliva, and is therefore a sialogogue. Its beneficial effects on the mouth and throat are due to its local antiseptic action.

General Therapeutics.—Employed in some of the fevers, croup, salivation, tonsillitis, mercurial salivation, and all inflammations of the oral cavity. The voice “Tabloids” of Burroughs, Wellcome, and Co. are very efficacious in catarrhal conditions of the throat. They consist of Chlorate of Potash, Borax, and Cocaine, the last-named drug allaying irritation.

Dental Therapeutics.—*As a Refrigerant and Alterative.*—It is a most valuable drug in all forms of inflammation of the mouth and tongue. In ulcerative

stomatitis, given both internally and as a mouth-wash, it acts as a specific, and the same can be said of it in tonsillitis, particularly when combined with Tincture of the Perchloride of Iron.

In the latter case, the following can be ordered :

Tincture of Perchloride of Iron .	2 drachms.
Chlorate of Potassium . . .	80 grains.
Spirits of Chloroform . . .	80 minims.
Glycerine	3 drachms.
Water to	8 ounces.

Two tablespoonfuls to be taken every four hours.

At the same time, attention must be paid to the state of the bowels, constipation being avoided, and the throat well steamed with hot water.

In aphthous conditions of the mouth in young children, it can be given either in a mixture, or applied locally with honey, in doses of 3 to 5 grains, according to age.

A mixture of Chlorate of Potassium, Tincture of the Perchloride of Iron, and Glycerine explodes when kept in a warm place (Murrell).

Dose.—10 to 30 grains.

POTASSII IODIDUM

(Iodide of Potassium)

Formula.—KI.

Source.—Obtained by dissolving Iodine in Liquor Potassæ, and evaporating to dryness, mixing the

residue with Charcoal, and fusing; dissolving and purifying.

Characters.—Colourless, opaque, cubical crystals. Soluble in Water, less so in Spirit.

Pharmacology.—It is an alterative, diuretic, sialogogue, expectorant, and indirect antispasmodic. Its properties are similar to those of Iodine, but it is less irritating. It occasionally produces headache, flushing of the face, gastric irritation, coryza, great depression, and in some cases salivation. The last symptom is caused in all probability by those who have previously undergone treatment by Mercury, which has accumulated in the system in the form of an insoluble Albuminate, which on the administration of the Iodide, has been set free.

General Therapeutics.—It is of great service in the different forms of glandular enlargements, chronic skin affections, rheumatism, gout, &c. In the various tertiary forms of syphilis, such as nodes, ulcers, and affections of the nervous system, Iodide of Potassium is of the utmost value. In chronic bronchitis, where the mucus is thick and tenacious, and expectoration difficult, it acts beneficially by thinning the secretion. It is given in cases of Lead poisoning, to eliminate the drug from the system. If the salt causes too much depression, Iodide of Sodium can be given instead.

Dental Therapeutics.—*As an Alterative.*—It is given internally in syphilitic ulcerations of the oral cavity, neuralgia due to the same cause, mercurial stomatitis, dental exostosis, and chronic rheumatoid arthritis of the mandibular articulation. In all these cases it is

best to begin with a dose of about 5 grains, which can be gradually increased.

Iodide of Potassium	.	.	.	40 grains.
Syrup of Orange Flower	.	.	.	1 drachm.
Spirit of Chloroform	.	.	.	2 drachms.
Water to	.	.	.	8 ounces.

Two tablespoonfuls to be taken three or four times a day.

Dose.—2 to 20 grains.

POTASSII PERMANGANAS

(*Permanganate of Potassium*)

Formula.— KMnO_4 .

Source.—Made by evaporating equal parts of Black Oxide of Manganese and Chlorate of Potassium, with a slight excess of Caustic Potash; pulverising the residue, semi-fusing, cooling and pulverising; boiling in Water, neutralising the decanted liquor with Carbonic Acid Gas; evaporating, crystallising, and drying.

Characters.—Dark purple prismatic crystals; soluble in Water.

Pharmacology.—It is a disinfectant, deodorant, and mild antiseptic; it is also a mild escharotic when applied in substance or strong solution.

General Therapeutics.—It is sometimes used as a dressing for foul ulcers; to disinfect stools and foul discharges, after removal from patient; to flush water-closets, &c. In the form of injections, lotions, or spray, it is used to correct the fœtor of cancer, abscesses, ozæna, otorrhœa, ulcerated sore throat, &c.

Dental Therapeutics.—*As a Deodorant and Anti-septic.*—It is a safe and efficient injection in diseases of the antrum, such as empyema, the patient being shown how to use the syringe, after an opening has been made, and when necessary, a small plate has been applied.

In all kinds of foetid ulcerations of the mouth, it can safely be used as a mouth-wash. The strength of the solution varies from 2 to 12 grains to 1 ounce of distilled Water.

It forms a good mouth-wash when used in a weak solution after ordinary cases of extraction, especially if there has been an alveolar abscess, or there is reason to believe a slight fracture of the alveolar border has happened. As a dressing for putrid pulps and canals, other drugs are to be preferred.

Dose.—1 to 5 grains.

SODIUM COMPOUNDS

SODII BICARBONAS

(*Bicarbonate of Soda*)

Formula.— NaHCO_3 .

Synonym.—Sesquicarbonate of Sodium.

Source.—Prepared by saturating the Carbonate of Sodium with Carbonic Acid Gas.

Characters.—A white powder with an alkaline taste and reaction. Freely soluble in Water.

Pharmacology.—It is an antacid. Its action is similar to that of the Bicarbonate of Potassium. It is one of the antidotes to the Mineral Acids.

General Therapeutics.—It is given internally in the different forms of dyspepsia, either before or after meals, according to the symptoms, and is used externally in certain skin diseases, as well as for burns and scalds of the first degree.

Dental Therapeutics.—*As an Antacid.*—It frequently relieves toothache of the temporary teeth, when the patient is too young to have them extracted or stopped, by dropping a little into the cavity, and rubbing some gently on the gum. In incipient cases of erosion, an alkaline and antiseptic mouth-wash like the following should be ordered:

Bicarbonate of Sodium . . .	2 drachms.
Listerine	1 ounce.
Water to	10 ounces.

To be used as a mouth-wash.

In cases where the clasp of a denture is irritating the neck of a tooth, the patient should be directed to rub the latter with a little Bicarbonate of Sodium, two or three times a week, and also brush the *inside* of the clasp with the same.

It is used as an ingredient of tooth-powders, but the author prefers the Carbonate of Magnesium, as it is lighter.

Combined with other drugs, such as Rhubarb, it is given internally to children, in the different aphthous conditions of the mouth.

Like the Potassium salt, it is used as a mouth-wash, to neutralise the effect of any of the Mineral Acids, whilst they are being taken.

Dose.—10 to 60 grains.

SODII BIBORAS

(Biborate of Soda)

Formula.— $\text{Na}_2\text{B}_4\text{O}_7, 10\text{H}_2\text{O}$.

Synonym.—Borax.

Source.—It occurs in the native state, but is also made by boiling together Boric Acid and Carbonate of Sodium.

Characters.—Generally seen in irregular masses or six-sided prisms, which are partially soluble in Water, freely so in Glycerine ; insoluble in Spirit.

Preparations.—Glycerinum Boracis, Mel Boracis.

Pharmacology.—Its action as an antiseptic and disinfectant is similar to that of Boric Acid, but in a much milder degree. It is also a detergent and antacid, and has a sedative effect on the mucous membrane of the mouth and throat.

General Therapeutics.—Its chief use is as an external application in some forms of parasitic and itching skin diseases, and to allay irritable conditions of mucous membranes.

Dental Therapeutics.—*As a Mild Antiseptic and Detergent.*—The Glycerinum Boracis and Mel Boracis are much used for aphthous and other ulcerations of the mouth, and slight cases of fissured sore tongue. For mercurial stomatitis, Chlorate of Potassium is certainly preferable. It forms a simple and soothing mouth-wash after numerous extractions, when powdered and combined with Tincture of Myrrh in the proportion of a teaspoonful of each in a tumbler of

water. Direct the patient to rinse out the mouth several times a day ; should it be necessary to write a prescription, the following can be used :

Biborate of Sodium	. . .	4 drachms.
Glycerine	. . .	1 ounce.
Tincture of Myrrh	. . .	$\frac{1}{2}$ ounce.
Rose Water to	. . .	10 ounces.

To be used as a mouth-wash.

Other Dental Uses.—It is used in the workroom as a “flux” in fusing and soldering metals ; also to harden plaster casts, which should first of all be thoroughly dried, immersed in a boiling solution of Borax and Water, and then set aside to cool.

Dose.—5 to 40 grains.

SODA CAUSTICA

(*Caustic Soda*)

Formula.— NaHO .

Synonym.—Hydrate of Soda.

Source.—From Liquor Sodæ, like Potassa Caustica.

Characters.—Hard, greyish-white fragments, very alkaline and corrosive, slightly deliquescent.

Pharmacology, Therapeutics, and Antidotes.—Similar to those of Potassa Caustica.

SODII PHENAS (not official)

*(Phenate of Sodium)***Formula.**— $\text{NaC}_6\text{H}_5\text{O}$.**Synonyms.**—Carbolate of Sodium, Phénol sodique.**Source.**—By mixing Caustic Soda with Carbolic Acid and a small quantity of Water, evaporating, and converting by heat, into a fluid of an oily consistence.**Characters.**—It is obtained as a saponaceous mass of acicular crystals of a lightish pink colour, which are freely soluble in Water, Creasote, and Carbolic Acid.**Pharmacology.**—It is a hæmostatic, antiseptic, disinfectant, and anodyne.**General Therapeutics.**—Externally, it is used as a styptic in cases of hæmorrhage, as a dressing for burns and wounds, and as a disinfectant application in throat affections, ozæna, &c.**Dental Therapeutics.**—*As a Hæmostatic and Astringent.*—It can be used for hæmorrhage after tooth extraction. It should, however, not be depended on in severe cases, but rather in those where there is a general oozing, and where a styptic *mouth-wash* only is needed, and not plugging. For soft and spongy gums, it can be diluted with one to twelve parts of Water, and the patient directed to rinse out the mouth several times a day.*As an Antiseptic and Disinfectant.*—It can safely be employed, diluted as above, in the various aphthous conditions of the mouth. For offensive breath, order

a solution in the strength of 2 drachms to 8 ounces of Water as a mouth-wash; at the same time, attention must be paid to the cause, such as polypus of the gum, suppuration of the pulp, &c., which should be removed.

As an Anodyne.—It is most useful in relieving the pain which often exists after a tooth or teeth have been extracted. In such cases, apply a little on some cotton wool to the painful spot; the patient will at first complain of some burning, smarting pain, which is, however, followed by relief.

SODII SULPHIS

(*Sulphite of Sodium*)

Formula.— $\text{Na}_2\text{SO}_3, 7\text{H}_2\text{O}$.

Source.—Made by saturating a solution of Carbonate of Sodium or Caustic Soda with Sulphurous Acid Gas.

Characters.—Colourless transparent prisms; inodorous; saline taste; feebly alkaline. Soluble in Water and Spirit. Should be kept in well-stoppered bottles, as it changes on exposure into Sulphate of Sodium.

Pharmacology.—It is a disinfectant, parasiticide, bleaching agent, and purgative.

Dental Therapeutics.—*As a Disinfectant and Parasiticide.*—It is used as an application, combined with Glycerine, in the following proportions, for aphthæ of the mucous membrane, due to zymotic conditions:

Sulphite of Sodium	.	.	2 drachms.
Glycerine	.	.	$\frac{1}{2}$ ounce.
Water to	.	.	2 ounces.

With a camel's-hair brush carefully smear the white patches every two or three hours.

As a Bleaching Agent.—See Acidum Boricum (page 53).

Dose.—5 to 20 grains.

ZINCI CHLORIDUM

CHLORIDE OF ZINC

Formula.— ZnCl_2 .

Synonym.—Butter of Zinc.

Source.—Obtained by the action of Hydrochloric Acid on granulated Zinc; purifying with Chlorine Water and Carbonate of Zinc; filtering, evaporating, and pouring into moulds.

Characters.—Colourless pencils like Nitrate of Silver, or tablets, very deliquescent and caustic. Soluble in Water, Ether, and Alcohol. On account of its deliquescence, it should be kept in well-stoppered bottles.

Preparation.—Liquor Zinci Chloridi (Burnett's Disinfectant).

Pharmacology.—It is a powerful and penetrating escharotic; antiseptic, disinfectant, astringent, hæmodynamic, and obtundent of sensitive dentine. Its escharotic effect is due to its affinity for water, and its power of coagulating albuminous material. It penetrates deeply into the tissues, and causes severe burning pain. The eschar produced separates in five to six days.

As an obtundent of sensitive dentine, its power is

due not only to its coagulating properties, but also to the fact that it penetrates the dentinal tubes. It should never be given internally, on account of its irritant effects.

General Therapeutics.—Made into a paste with flour or gypsum (to prevent its escharotic action extending too deep), it is used to destroy lupus, rodent ulcer, morbid growths, gangrenous parts, warts, and nævi.

Dental Therapeutics.—*As an Escharotic and Obtundent.*—These two actions have been classed together, as the anodyne effect of Chloride of Zinc is dependent on its escharotic action. For the relief of sensitive dentine, it should be used as follows:—Apply the rubber dam, thoroughly dry the cavity with bibulous paper and hot-air syringe, place a small piece of the Chloride in the cavity, and allow it to remain a few minutes. Great pain as a rule follows the application, but this may be modified by either having previously swabbed out the cavity with Tincture of Aconite, or by using Cocaine. The extreme pain will, however, gradually disappear, and the excavation of the cavity can be proceeded with. After removal of some of the dentine, pain is again felt, when another application must be made. It is an important matter that in all cases of sensitive dentine, whatever drug be applied for its relief, *sharp* instruments must be used. Also, that cutting in one direction gives pain, in another, the reverse. In cervical cavities in the front of the mouth, where Nitrate of Silver is not applicable, it is most serviceable by occasionally touching the cavity with the crystal before proceeding to excavate.

It should never be used as an obtundent when the sensitive dentine is near the pulp, as it will set up irritation of that organ.

It can be applied to granulations arising from necrosis after extractions, and to those which occur at times after the removal of an epulis. In the latter case, some authorities say it should not be applied, as it is liable to cause irritation, and a recurrence of the growth.

As a Hæmostatic.—It may be used to stop alveolar hæmorrhage, but is in no way superior to the *Liquor Ferri Perchloridi*.

As an Astringent and Disinfectant.—In a dilute form, it is used as an injection in chronic alveolar abscess, empyema of the antrum, and ranula. Also as a mouth-wash after removal of an epulis, in the strength of 3 grains to 1 ounce of water.

Other Dental Uses.—It is one of the ingredients of the Osteoplastic fillings, and as there are other preparations of Zinc which enter into the composition of these, the author has classed them under the present heading.

The Osteoplastic Fillings.—There are three varieties, viz. the Oxychloride, the Oxyphosphate, and the Oxysulphate, the chief ingredient of the *powdered* portion of each, being Oxide of Zinc, which has been heated for two hours, and then finely pulverised.

I. The Oxychloride.—The powder consists of Oxide of Zinc, with or without a little Biborate of Sodium and Silica, whilst the liquid portion is a solution of Chloride of Zinc.

Characters and Uses.—It readily imbibes moisture

from the atmosphere, and therefore should be kept well stoppered. It sets slowly, and acts as an irritant if placed too near the pulp. It is also an antiseptic.

Its chief uses are for filling the roots of teeth; as an obtundent of sensitive dentine (providing it is not placed near the pulp); and for filling cavities which have been bleached. As a root filling, it must be mixed very thin, and carried up with some filaments of cotton wool on a Donaldson bristle.

It is quickly acted upon by the fluids of the mouth, especially at cervical margins, and is classed under the heading of temporary fillings.

II. The Oxyphosphate.—The powder is Oxide of Zinc, and the liquid portion, one of the varieties of Phosphoric Acid.

Characters and Uses.—It is more durable than the Oxychloride, and is not quite so irritating. It is used in cavities in front of the mouth where the walls are thin, and in which gold is contra-indicated; or if a gold filling is required, it can be used to line the walls to strengthen them. In the teeth of young children who cannot, or will not, undergo the preparation required for a metallic filling, it is useful on account of its quicker adaptability. In sensitive cavities, where it would be unwise to insert a metal filling, an Oxyphosphate can be used and left in for three or six months as an obtundent. It is also best for fixing-in mineral inlays.

III. The Oxysulphate.—The powder of this is composed of Calcined Sulphate of Zinc and Oxide of Zinc, and the fluid portion is a solution of Gum Arabic.

Characters and Uses.—This is a non-irritating preparation, and can be applied to cavities as a flooring, when very near the pulp. Also as a temporary stopping for a few weeks, in those cases where the dentine is so acutely sensitive that its removal cannot be borne.

It is used as a material for fixing a cap over an exposed pulp, and can be applied in a very liquid form, over an exposure. In the latter case, the cavity should be first gently mopped out with an antiseptic, or an antiseptic which will not interfere with the hardening can be mixed with the Oxysulphate, and a small quantity, about the size of a pin's head, should be dropped near the exposure, where it will spread itself out and form an effective cap.

General Remarks on the Osteoplastics.—There are many varieties sold, and each one has its virtues. Some are put up in various shades to enable the operator to match the colour of the front teeth. They should never be inserted as permanent stoppings, their duration as a rule being about two years, though some last much longer. In the majority of cases the rubber dam should be applied to exclude all moisture; when working the osteo into its place, lubricating the instruments with some substance such as Vaseline will prevent any adherence. They are sometimes used in combination with Amalgam, in saucer-shaped cavities where it is difficult to obtain any retaining pits. For this purpose the Amalgam is first mixed very dry, all excess of Mercury being thoroughly squeezed out. The osteo, preferably the Oxyphosphate, is then mixed thinner than usual, and the

two carefully mixed with a firm spatula, and the filling inserted in the ordinary way. Another method is as follows:—First get the Amalgam mixed ready for filling; then place an osteoplastic round the walls of the cavity, being careful to see none is near the edges, and before it has time to set, insert the Amalgam. It is asserted that by this method the Amalgam cannot shrink. Osteoplastics are useful for starting gold fillings in deep cavities, by placing some strips or pellets of cohesive gold into the osteo before it has set.

They are also used to fix the different kinds of crowns to the roots of teeth, and, as an emergency, to hold an artificial tooth in, which has broken away from a vulcanite plate, should there be no time to vulcanise it properly.

Antidotes (to Chloride of Zinc).—Albumen, milk, Carbonate of Sodium or Potassium in large quantities, emetics, stomach-pump.

ZINCI OXIDUM

OXIDE OF ZINC

Formula.— ZnO .

Source.—Made by heating the Carbonate of Zinc till the whole of the Carbonic Acid and Water are expelled.

Characters.—A whitish powder, odourless and tasteless. Insoluble in Water.

Preparation.—Unguentum Zinci.

Pharmacology.—Applied locally, it is a sedative and

absorbent; in treatment of the dental pulp, it is a conservative agent. Given internally, it is a non-irritant astringent, nervine tonic, and antispasmodic.

General Therapeutics.—Given in cases of chorea, epilepsy, neuralgia, the night sweats of phthisis, hysteria, and whooping-cough. Externally, it is applied to excoriated surfaces, herpes, &c., either in dry powder mixed with starch, or ointment.

Dental Therapeutics.—*As an Antispasmodic.*—It is given in infantile convulsions due to teething, in doses of $\frac{1}{2}$ to 5 grains with a little sugar.

As a Conservative Agent.—Mr. R. H. Woodhouse recommends it in combination with Carbolic Acid and Eau de Cologne, in the form of a thin paste, in badly decayed teeth of children, where the pulp is not exposed, but has only a thin layer of softened dentine over it; also in the teeth of adults, where exposure has taken place, but the pulp is healthy and warrants conservative treatment. In advocating this, he points out the advisability of absolute isolation from the fluids of the mouth, to prevent the progress of decalcification. He leaves the preparation in for a week or so, when the tooth can be more carefully excavated and filled with Sullivan's cement or osteo. Mr. Woodhouse also uses the same preparation for root fillings.

Other Dental Uses.—It is one of the ingredients of the *powdered* portion of the Osteoplastic fillings (see pages 117, 118).

Dose.—2 to 10 grains.

ZINCI SULPHAS

SULPHATE OF ZINC

Formula.— $\text{ZnSO}_4, 7\text{H}_2\text{O}$.

Source.—Obtained by the action of Sulphuric Acid on granulated Zinc, purifying with Chlorine Water, and Carbonate of Zinc; evaporating and crystallising.

Characters.—Colourless crystals, resembling Sulphate of Magnesium, with a metallic styptic taste. Soluble in Water, insoluble in Alcohol.

Pharmacology.—It is a tonic, astringent, anti-spasmodic, and emetic.

General Therapeutics.—One of its chief uses is as an emetic in narcotic and other poisonings. It should be given in warm water in doses of 10 to 20 grains, the latter for preference. Its advantage for this purpose over Ipecacuanha and Antimony, is that it causes less nausea and after-depression. The following forms a good emetic (Murrell):

Sulphate of Zinc	.	.	30 grains.
Powdered Ipecacuanha	.	.	50 „

To be taken in water.

In severe cases of quinsy, this can be given, the emesis produced thereby frequently causing the abscess to burst, and so saving lancing.

As an antispasmodic, it is employed in cases of epilepsy, chorea, hysteria, &c., but is in no way superior to the Oxide.

It is used externally as an astringent for relaxed and discharging mucous surfaces, and as an injection

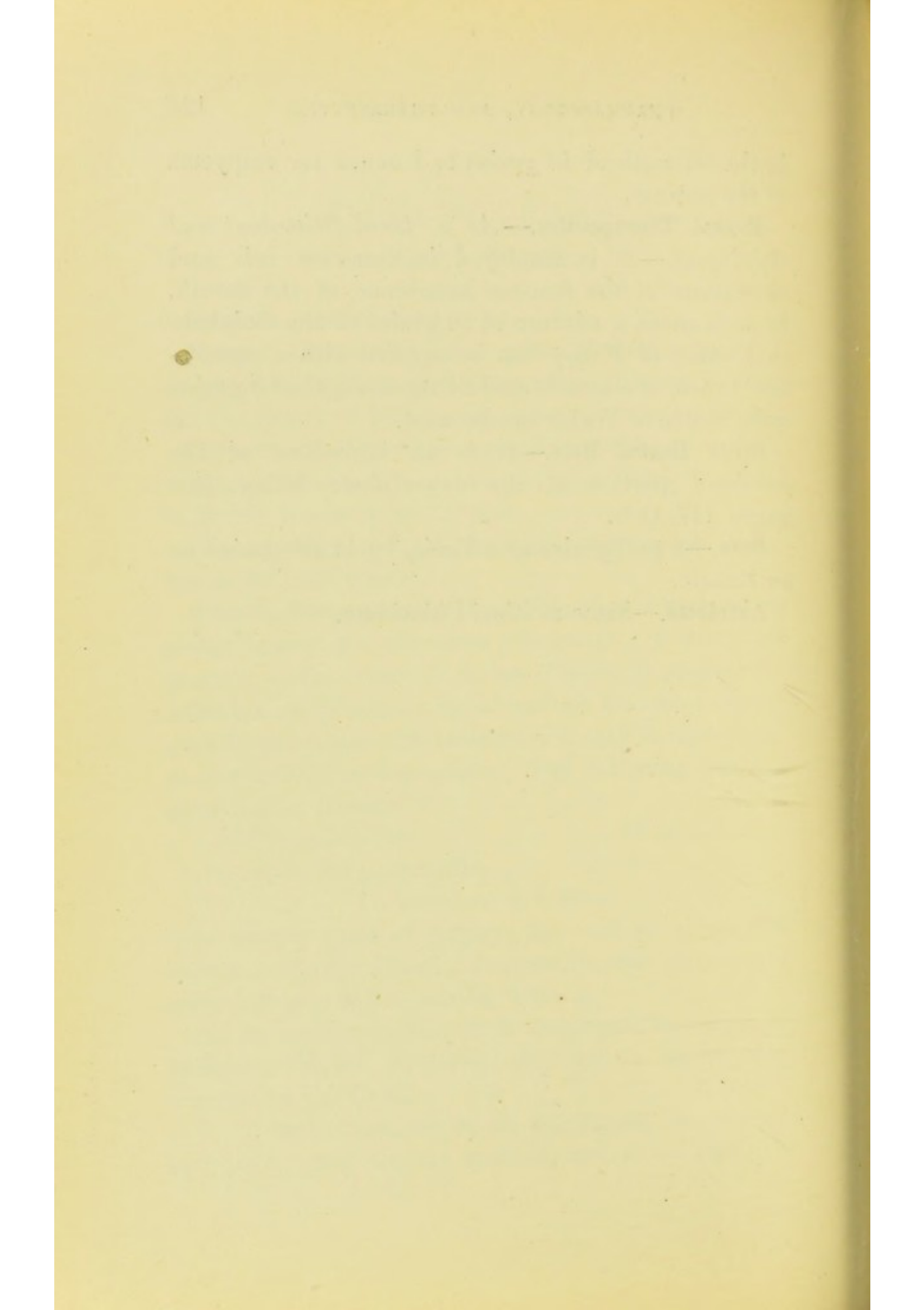
in the strength of 10 grains to 1 ounce for empyema of the antrum.

Dental Therapeutics.—*As a Local Stimulant and Astringent.*—It is employed in cancrum oris and ulcerations of the mucous membrane of the mouth. In such cases, a mixture of 20 grains of the Sulphate to 1 ounce of Honey can be applied with a camel's-hair brush, or a mouth-wash of the strength of 3 grains to an ounce of Water can be used.

Other Dental Uses.—It is an ingredient of the *powdered* portion of the oxysulphate filling (see pages 117, 118).

Dose.—1 to 3 grains as a Tonic, 10 to 30 grains as an Emetic.

Antidotes.—Same as Zinci Chloridum.



SYNTHETICAL COMPOUNDS

БИБЛИОТЕКА ИМПЕРАТОРСКОГО
УЧЕБНОГО ЗАВЕДЕНИЯ

SYNTHETICAL COMPOUNDS

ACIDUM CARBOLICUM

CARBOLIC ACID

Formula.— C_6H_5HO .

Synonyms.—Phenic Acid, Phenol, Phenyl Alcohol.

Source.—It is obtained from coal-tar oil by fractional distillation and subsequent purification.

Characters.—When pure, it is seen in the form of colourless acicular crystals, which at 91.5° F. become an oily fluid, possessing a strong odour and a burning taste. It is only slightly soluble in Water, freely so in Alcohol, Ether, and Glycerine.

Pharmacology.—It is a powerful antiseptic, germicide, deodorant, disinfectant, sialogogue, hæmostatic, obtundent, rubefacient, escharotic, local stimulant, and local anæsthetic. Administered internally, it is a sedative and carminative (by virtue of its antiseptic properties), and possesses the power of allaying vomiting and gastric irritability. It resembles Creasote in many of its characters and medicinal properties. Professor Lister considers Carbolic Acid superior to all other agents, as a most potent poison to all those low forms of animal life determining putrefaction.

As a local anæsthetic, it exerts a very soothing influence on painful tissue. When applied to the skin or mucous membrane, it produces a burning sensation, which is of short duration, and a white patch afterwards appears, which becomes brown or black.

In large doses it is an irritant poison.

General Therapeutics.—It is employed as a “spray” in the treatment of wounds, and during operations. As an inhalation, in gangrene of the lungs. As a dressing for wounds, in the form of gauze. As an antiseptic, to cleanse instruments, and to purify sponges and the hands of the operator. For these purposes, a 5 per cent. solution should be used.

Dental Therapeutics.—*As an Antiseptic.*—In a diluted form (1 in 40), either with Water or Absolute Alcohol, it is used for the treatment of dead teeth, where there is no formation of pus. Coagulating albumen as it does, it would greatly interfere with the fluidity of pus, and hence increase the difficulty of its removal. An exception to this, however, is when there is a fistulous opening on the gum. In these cases, dilute Carbolic Acid pumped up the canal of the tooth, till a white stain appears on the gum, will in the majority of cases effectually cure a chronic alveolar abscess.

It may also be used, in the diluted form, for swabbing out ordinary cavities before filling. In these cases, it should be combined with Absolute Alcohol, which quickly evaporates and leaves the cavity dry.

When an antiseptic mouth-wash or tooth-powder is required, Carbolic Acid can be safely prescribed in the following proportions:

Mouth-Wash.

Carbolic Acid	.	.	.	20 drops.
Glycerine	.	.	.	1 ounce.
Rose Water	.	.		to 10 ounces.

Tooth-Powder.

Precipitated chalk	.	.	.	3 ounces.
Orris root, powdered	.	.	.	3 drachms.
Carbonate of Magnesium	.	.	.	4 „
Carbolic Acid	.	.	.	30 drops.

As an Escharotic.—Applied to an ulcerated exposed pulp, the strong acid (from its escharotic properties) forms an eschar, which has been thought to be conducive to the recovery of that organ. The solution should not, however, be used stronger than 1 in 20, for it would act as an irritant, destroy the layer of odontoblasts, and so prevent the formation of secondary dentine, the presence of which is absolutely necessary if the pulp is to be preserved.

In cases of devitalisation of the pulp with Arsenic, it will be frequently found that a small portion of the nerve at the end of a canal is still alive. As it would be unwise to apply Arsenic so near the apical foramen, an application of strong Carbolic Acid will usually complete the operation.

As an Anodyne.—In a dilute form, it can be applied to the gums, after extraction of teeth, to deaden the pain which follows. It also allays the pain of sensitive dentine, which it does by coagulating the contents and sealing up the ends of the dentinal tubes. For this

purpose, it should not be used with Glycerine, as this latter drug would intensify the pain.

As a Local Stimulant.—In combination with Glycerine (1 in 40), it may be used to increase the secretion of the palate, for the purpose of retaining suction plates. It stimulates the action of the mucous follicles. The solution is painted on the gums and palate with a camel's-hair brush.

As a stimulating lotion for relaxed conditions of the uvula and soft palate, the following will be found most efficacious :

Carbolic Acid	.	.	$\frac{1}{2}$ drachm.
Glycerine	.	.	1 ounce.
Water	.	.	to 2 ounces.

To be painted twice a day over the relaxed parts.

After the removal of tartar, the edges of the inflamed gums will be greatly improved by the use of a 1 in 20 solution locally.

As a Styptic.—In slight cases of hæmorrhage after tooth extraction, or when the gum has been accidentally injured when stopping, a pledget of cotton wool should be dipped in a strong solution, and applied carefully to the spot, where the oozing is taking place; the *rationale* of its action being that it coagulates the albumen at the mouth of the bleeding vessel, and so forms an effectual plug.

Dose.—1 to 3 grains.

Antidotes.—Olive oil, white of egg, emetics, stimulants, and the Sulphates, such as Sulphate of Sodium or Sulphate of Magnesium—the two last-named form Sulphocarbolates which are harmless. The application of Olive Oil will greatly lessen its caustic effects, should

a strong solution drop in the mouth or on the lips or cheeks of a patient.

ÆTHER

ETHER

A description of this drug as a Dental Anæsthetic will be found under **Anæsthetics**.

Formula.— $(C_2H_5)_2O$.

Synonyms.—Oxide of Ethyl, Sulphuric Ether, Ethyl Ether.

Source.—It is obtained by the distillation of Alcohol and Sulphuric Acid ; agitating with Slaked Lime and Chloride of Calcium in Water, and redistilling.

Characters.—It is a colourless volatile liquid, with a strong odour and hot taste. Sp. gr. 0·735.

Pharmacology.—It is both a General and Local anæsthetic, cardiac stimulant, sialogogue, vesicant (when rubbed in), antispasmodic, and carminative.

Dental Therapeutics.—*As a Local Anæsthetic.*—It is used as a spray, for relieving the pain of tooth extraction. A suitable apparatus must be used, and the spray applied to the gum on each side of the tooth. The anæsthetic effect is due to the parts being frozen by evaporation of the Ether.

As a Solvent.—It can be used to remove greasy material from carious cavities and pulp canals ; but Chloroform is preferable, as it has not such a pungent odour.

Other Dental Uses.—It is used as a freezing agent, when cutting sections in Dental Microscopy.

ALCOHOL ETHYLICUM

Formula.— C_2H_5HO .

Synonyms.—Absolute Alcohol, Ethylic Alcohol.

Source.—Made by macerating and shaking Rectified Spirit with Carbonate of Potassium; decanting; macerating, and shaking with freshly fused Chloride of Calcium, and distilling.

Characters.—It is a colourless limpid fluid, with a sp. gr. of 0.797; boils at 173.6° Fahr.

Pharmacology.—It is a diuretic, diaphoretic, stimulant, solvent, disinfectant, and antiseptic. In the form of a lotion when diluted, it is a refrigerant. It is also slightly anæsthetic in its action, and is an obtundent of sensitive dentine. It has a great affinity for water, which it extracts from soft living tissues when it comes in contact with them. When taken undiluted into the mouth, it has a hot painful stimulating effect on the tongue and mucous membrane, forms with the secretions a thin layer of coagulated albumen, and the epithelium becomes whitened, whilst partial anæsthesia is produced.

General Therapeutics.—It is given as a stimulant in the form of Brandy in cases of syncope, hæmorrhage, and collapse. Also in certain cases of fever, chronic disease attended with debility, melancholia, hysteria, insomnia, &c. The advisability, or not, of giving this

drug in these and other cases is too complex a question to be gone into in a work of this kind.

Applied locally in the form of Brandy, it is rubbed into the skin to prevent bedsores, by hardening and disinfecting the epidermis.

Dental Therapeutics.—*As an Obtundent and Anodyne.*—Absolute Alcohol relieves the pain of sensitive dentine, by coagulating the contents of the dentinal tubes. The cavity should be thoroughly well dried with bibulous paper and the hot-air syringe, and then swabbed out with Alcohol.

In the form of Brandy or Whisky, held in the mouth where there is an aching tooth, the pain will often be relieved. Its antiseptic properties may have as much to do in this matter, as its anodyne properties.

As an Antiseptic.—It is a germicide, and hence assists the action of other drugs, such as Bichloride of Mercury, Carbolic Acid, &c., in the treatment of dead teeth. It quickly evaporates, and leaves the cavity and canals perfectly dry with the accompanying drug remaining.

As a Solvent.—It is used as a solvent for such drugs as Carbolic Acid, Bichloride of Mercury, Tannic and Gallic Acids, &c.

As a Stimulant.—It is given in the form of Brandy or Whisky, in cases of syncope, after or during the administration of Dental Anæsthetics. It is also used as a local stimulant in cases of mercurial and other forms of stomatitis.

Other Dental Uses.—It is used in Dental Microscopy as a *fixing* and *hardening* reagent, more particularly

of pathological specimens. It penetrates well, and preserves nuclei. It is also useful as a dehydrating agent.

Antidotes.—Stomach-pump, emetics, strong coffee, the cold douche.

AMYL NITRIS

NITRITE OF AMYL

Formula.— $C_5H_{11}NO_2$.

Source.—It is produced by distilling Nitric Acid with Amylic Alcohol, Sulphuric Acid, and Copper; purifying the product with Caustic Soda, Carbonate of Potassium, and fractional distillation.

Characters.—It is an ethereal liquid of a yellowish colour, and a peculiar odour. Freely soluble in Rectified Spirit, Ether, and Chloroform; insoluble in Water.

Pharmacology.—It is an anodyne, antispasmodic, and antidote. When inhaled, it causes increased action of the heart, increasing the pulse in from 3 to 10 seconds, producing a sense of fulness and throbbing in the head, flushing of the face, visible pulsation of the carotids, and a sense of oppression on the chest. Its specific action is confined almost to the circulatory system. It causes dilatation of the peripheral vessels by relaxing their muscular coats; at the same time, the heart's action is greatly accelerated, with but little if any increase of its force.

General Therapeutics.—It is given for angina pectoris, asthma, sea-sickness, and syncope.

Dental Therapeutics.—Its chief use is for the relief of syncope during or after the administration of anæsthetics. For this purpose, capsules are made which contain 2 to 5 minims of the drug, and are wrapped up in lint. These capsules can in case of emergency be broken with the fingers, placed in a handkerchief, and applied to the nostrils.

As an Antispasmodic and Anodyne.—In neuralgia of the fifth nerve, it frequently relieves pain by an inhalation of 3 minims. If given internally, the dose is $\frac{1}{2}$ to 1 minim.

Antidotes.—Stomach-pump, emetics, fresh air, the recumbent position, artificial respiration. There is no case of poisoning by Nitrite of Amyl on record.

BUTYL-CHLORAL HYDRAS

HYDRATE OF BUTYL-CHLORAL

Formula.— $C_4H_5Cl_3O, H_2O$.

Synonym.—Croton Chloral.

Source.—Made by the action of Chlorine gas upon Aldehyde.

Characters.—Small white silvery crystals, with a sweetish taste like that of melons. Soluble in Spirit and Water.

Pharmacology.—It is an anodyne, anæsthetic, and hypnotic. It has the peculiar effect of narcotising the brain without the rest of the nervous system being affected, but its special action is on the fifth nerve. As a hypnotic it is inferior to Chloral Hydrate.

General Therapeutics.—Given to relieve the pain of tic douloureux, neuralgia of the limbs, &c.

Dental Therapeutics.—It is of great use for the relief of all kinds of neuralgia. Where Chloride of Ammonium has failed to give relief, the author generally prescribes the following :

Hydrate of Butyl-Chloral	5 grains,
Syrup of Tolu	1 drachm,
Spirit of Chloroform	10 minims,
Water	to 1½ ounces,

and orders the dose to be repeated in an hour if relief is not obtained. It can also be given in the form of a pill (3 grains every quarter-hour for the first hour, and afterwards every hour). It is of little use in odontalgia pure and simple, unless this induces neuralgia, in which case it will relieve the neuralgia whilst the odontalgia remains. It is very serviceable in the toothache of pregnancy (when extraction from various reasons may be inadmissible), in doses of 5 to 10 grains.

Dose.—5 to 15 grains.

CHLORAL HYDRAS

HYDRATE OF CHLORAL

Formula.— C_2HCl_3O, H_2O .

Source.—Made from Chloral, an oily liquid, by the addition of Water.

Characters.—Colourless crystals with a pungent odour and a bitter taste.

Pharmacology.—It is a powerful hypnotic; it has certain anodyne effects combined with other drugs, and in dilute solutions (5 grains to 1 ounce of water) is a weak antiseptic. From its depressant action on the heart, it should be given with great caution, particularly in cases of pulmonary disease, fatty degeneration of the heart, and atheromatous blood-vessels. Care should also be taken when prescribing this drug that the patient does not acquire the “Chloral habit.”

General Therapeutics.—It is given to produce sleep in all cases of insomnia, excepting that caused by pain. If in such cases sleep is obtained by giving a powerful dose (which is unwise), the patient wakes to suffering as before; but both sleep and relief from pain may be procured, by the judicious combination of Morphine and Chloral.

Dental Therapeutics.—*As an Anodyne.*—The chief use of this drug to Dentists, is when combined with Camphor and Aconite to *alleviate* the pain of tooth extraction. In such cases, the following prescription can be used:

Chloral Hydrate,

Camphor of each 2 drachms.

Tincture of Aconite,

Chloroform of each $\frac{1}{2}$ an ounce.

Apply carefully with a camel's-hair brush, over the root or roots of the tooth to be extracted, and allow it to remain one or two minutes before operating.

Dose.—5 to 20 grains.

Antidotes.—Emetics, stomach-pump, hot coffee, Nitrite of Amyl. Artificial respiration.

CHLOROFORMUM

CHLOROFORM

A slight reference to this drug as a Dental Anæsthetic will be found under **Anæsthetics**.

Formula.— CHCl_3 .

Source.—It is made by distilling Rectified Spirit with Chlorinated Lime and Slaked Lime; purifying by washing with Water and Sulphuric Acid; agitating with Slaked Lime and Calcium Chloride, and re-distilling; and lastly adding 1 per cent. by weight of Ethylic Alcohol.

Characters.—It is a colourless, heavy, volatile liquid, with an agreeable odour and a sweetish taste. It is soluble in Spirit, Ether, Olive Oil, and Turpentine; only slightly so in Water. Sp. gr. 1.49.

Pharmacology.—It is an anæsthetic, both general and local, carminative, antispasmodic, anodyne, stimulant, obtundent, and solvent. In the mouth, it stimulates the mucous membrane, and increases the flow of saliva. This is very noticeable when applying it to a carious cavity.

Dental Therapeutics.—*As a Local Anæsthetic.*—It is used for the extraction of easy teeth and loose roots, by placing saturated pledgets of cotton wool on each side of the gum, and allowing them to remain a few minutes before operating. In ordinary or difficult cases, this method should never be advised, for if it is successful, it is more likely to be due to the "faith" of the patient than to the drug. Combined with

Belladonna and Aconite it is used as a local application for the relief of neuralgia. (See Belladonna.)

As an Obtundent.—It occasionally relieves the pain of sensitive dentine, but is inferior for this purpose to Cocaine, Carbolic Acid, &c.

As an Antispasmodic.—It is administered for the convulsions of teething, and spasm of the glottis.

As a Solvent.—Applied to carious cavities, after the removal of caries, and canals, it is employed for removing any fatty material which may remain in either.

It is a solvent of Gutta Percha, and is used with that material for filling root canals, lining cavities, &c. (See Gutta Percha.)

Other Dental Uses.—It is used as a clearing agent in Dental Microscopy.

Antidotes.—*When Inhaled.*—Pull the tongue forward. Cold and warm douche to chest. Artificial respiration. Inhalation of Nitrite of Amyl. The interrupted current. Cardiac stimulants.

When Swallowed.—Stomach-pump, emetics. Rouse the patient. Injection of hot strong coffee. Inhalation of Nitrite of Amyl.

CREASOTUM

CREASOTE

Formula.— $C_8H_{10}O_2$.

Source.—A product of the distillation of Wood Tar.

It is not a simple body, but a variable compound of Guaiacol, $C_7H_8O_2$, and Creosol, $C_8H_{10}O_2$.

Characters.—A colourless, transparent liquid when fresh, but becomes yellow or brown after exposure to air. It has a strong odour and burning taste, and much resembles Carbolic Acid, but unlike it does not solidify on cooling. Sparingly soluble in Water, freely so in Alcohol, Ether, and Glacial Acetic Acid. Sp. gr. 1.071.

Pharmacology.—It is a rubefacient, escharotic, styptic, antiseptic, deodorant, coagulant, obtundent of sensitive dentine, and sialogogue. When applied to the tongue it produces great pain, and causes a strong taste of smoke, and a copious flow of saliva.

General Therapeutics.—It is used in the form of an inhalation, as a disinfectant and deodorant in all diseases of the lungs attended with foul discharges, for the vomiting of pregnancy, hysteria, and sea-sickness, and gastric irritability. In general practice, Guaiacol has been used instead of Creasote, particularly in diseases of the lungs, as it is more agreeable.

Dental Therapeutics.—*As an Antiseptic.*—It is used as a dressing for dead teeth, but some dentists prefer Carbolic Acid. It is used in the same way. (See Carbolic Acid, p. 128.)

With Tannic Acid it forms a useful application in ulceration and suppuration of the pulp. Combined with equal parts of Tincture of Iodine it can be used as an injection for alveolar abscess. This is not only antiseptic, but stimulating.

As an Obtundent.—For caries of the temporary teeth which are painful, and which require stopping

to prevent their too early removal, it is most efficacious, and the same can be said of it in the toothache of pregnancy.

It will frequently relieve the pain of sensitive dentine where other drugs have failed.

As a Styptic.—After extraction of teeth, if there is hæmorrhage, and no other drug available, Creasote can be used on some cotton wool, and pressure applied.

Dose.—1 to 3 minims.

Antidotes.—(Same as Carbolic Acid.)

ETHYL CHLORIDUM (NOT OFFICIAL)

CHLORIDE OF ETHYL

Synonym.—Hydrochloric Ether.

Description.—A colourless liquid with a sweetish burning taste. Its vapour is inflammable.

Pharmacology.—On account of its low boiling-point (about 50° F.), and the intense cold produced by evaporation, it is used as a *local* anæsthetic.

Dental Therapeutics.—It is employed to relieve, and in some cases prevent the pain of tooth extraction, and is sold for this purpose in glass bulbs terminating in a fine tube with a screw-capped point. The spray should be directed to the gum on each side of the tooth to be extracted, and as soon as it (the gum) becomes white, the operation may be proceeded with. It is recommended that the gum be first dried and then smeared with vaseline. The author's experience with this drug is that it is useful for teeth with single

roots, also for cutting away polypus of the gum, and in those cases of buried stumps where it is necessary to excise a portion of the gum, previous to extraction. In all cases, however, it certainly deadens the pain of insertion and penetration of the forceps, but its indiscriminate use as a *perfect* local anæsthetic for tooth extraction is unwise, and likely to cause loss of confidence between patient and dentist.

Anestile is a mixture of Ethyl and Methyl Chloride, and acts in the same manner as the above; it is supplied in screw-capped cylinders.

Coryl is a mixture of similar composition.

GLUSIDUM

GLUSIDE

Formula.— C_6H_4CO,SO_2NH .

Synonyms.—"Saccharin," Benzoyl-Sulphonic-imide.

Source.—It is obtained from Toluene, a coal-tar derivative.

Characters.—A light white crystalline powder, odourless, with a very sweet taste. Slightly soluble in cold Water, more so in boiling Water, Spirit, or Glycerine.

Pharmacology.—Used as a sweetening agent, and to cover the taste of nauseous drugs. It has also certain antiseptic powers.

General Therapeutics.—Given in diabetes, and in those diseases where sugar is contra-indicated.

Dental Uses.—*As an Antiseptic.*—Saccharin, espe-

cially in Alcoholic solutions, manifests a very remarkable action on the bacteria of the mouth. It is one of the least poisonous substances used in the treatment of that cavity, and has no deleterious action on the teeth.

Dr Miller recommends the following prescription as having a very marked effect on the number of living bacteria in the mouth :

Saccharin	5 grains.
Benzoic Acid	6 „
Tincture of Rhatany	$\frac{1}{2}$ drachm.
Absolute Alcohol	$3\frac{1}{2}$ drachms.
Peppermint Oil	1 drop.
Cinnamon Oil	1 „

To be used as a mouth-wash.

Mix 3 parts of this with 27 of Water, and hold in the mouth a full minute.

Dose.— $\frac{1}{2}$ to 2 grains or more. One grain sweetens 4 ounces of fluid.

IODIFORMUM

IODIFORM

Formula.— CHI_3 .

Source.—Made by heating Iodine with Carbonate of Potassium, Alcohol, and Water, and allowing the crystalline deposit to settle.

Characters.—It is met with, either in the form of small yellow crystalline scales—Powdered Iodoform; or as an amorphous powder—Precipitated Iodoform. It has an unpleasant odour and sweetish taste. Is

freely soluble in fixed and volatile Oils, Ether, and Chloroform; only slightly so in Water and Spirit. It contains more than 90 per cent. of Iodine.

Preparations.—These are numerous, some are official, some not. Those of interest to the dentist are the Iodoform Wool, and Iodoform Wax.

Pharmacology.—It is an antiseptic, disinfectant, and local anæsthetic. It is not a direct germicide, but probably acts by depriving bacteria of the nourishment necessary for their activity. According to some, its antiseptic properties are due to the setting free of Iodine. In general practice, the powdered Iodoform is used, as it does not “clot;” but the precipitated form is less irritating, and is more commonly employed for dusting on sores. In dental practice, both forms are used. As a rule, it does not cause irritation when applied locally. Should it do so, the wound must be washed with Oil of Eucalyptus, which is a solvent.

Cases of poisoning have occurred from this drug, symptoms of which are—Giddiness, vomiting, deep sleep which is interrupted with periods of excitement, then delirium, intense headache, and sense of suffocation. The pupils are normal.

General Therapeutics.—It is used to cleanse foul ulcers, especially of venereal origin. Mr Berkeley Hill states that, in ulceration of the tongue of a syphilitic nature, which is very obstinate, and with ragged, thickened epithelium, deep fissures, and severe pain, Iodoform is most useful, not only applied locally, but also given internally. Dr Foxwell of Birmingham recommends it as a specific for phthisis, given internally.

In ozæna, and ulcers of the mouth and throat, its local use has been much commended, a valuable insufflation being a mixture of Iodoform and Quinine or Bismuth (Mitchell Bruce).

Dental Therapeutics.—*As an Antiseptic.*—It is used either alone, or combined with Eucalyptus Oil, or as an Ethereal solution in the treatment of dead teeth. The same precautions must be taken as when using other antiseptics, such as application of rubber dam, drying cavity, and canals, &c. Pump up by means of some cotton wool, on a Donaldson bristle, a solution of Iodoform and Eucalyptus, and seal the cavity with Gutta Percha for a few days. The ultimate treatment of the root will depend upon its condition after removal of the dressing. Where there is any doubt of asepsis, a cotton wool and Iodoform dressing can be left in for some months, and a Gutta Percha filling inserted. At the end of this time, the cotton wool will be found to have retained its smell and colour, but it must not be forgotten, that micrococci have been seen growing in a fluid which was impregnated with Iodoform.

It is also employed for diseases of the Antrum and in pyorrhœa alveolaris, but its objectionable odour has to a certain extent limited its use.

Iodoform Wax is sometimes used as a root filling, but should not be relied on, as its application to back teeth is not easy, in addition to which, the wax in many cases seems to disappear from the canal.

A paste of Iodoform can be applied to an exposed and irritated pulp, and covered with Gutta Percha or an osteoplastic filling, where devitalization is deemed unnecessary.

As a Local Anæsthetic it is supposed to lessen the pain of Arsenic, and is therefore included as an ingredient of Arsenical paste.

Iodoform	.	.	.	5 grains.
Arsenic	.	.	.	10 „
Creasote	.	.	.	Sufficient quantity to make a paste.

Cocaine or Morphine, however, are to be much preferred in place of Iodoform.

It is also said to relieve the pain of neuralgia, in the form of an ointment mixed with Vaseline, but is seldom used for this purpose on account of its odour, unless mixed with Tonquin Bean.

Dose.—1 to 3 grains.

Antidotes.—When poisonous symptoms appear from a local application, wash out the wound with Eucalyptus Oil. When from internal administration, give 10 grains of Bicarbonate of Potassium every hour (Ringer).

Several drugs are spoken of as being efficacious in removing its objectionable odour. Amongst them are Balsam of Peru, Oil of Cinnamon, Oil of Lavender, and Tonquin Bean. The latter is the best. Put a bean in a bottle containing the Iodoform.

SUBSTITUTES FOR IODOFORM

AIROL (not official)

Airol is a powder of greyish-green appearance. It is a Gallate of Bismuth Iodide, the Iodine being so combined that it is able to exert an extremely active

antiseptic and deodorising action, without causing irritation or toxic effects from its too rapid liberation.

Dental Therapeutics.—The author has used with success this drug in the treatment of dead teeth. It is particularly useful in those cases where the pulp cavity and canals are in a moist and foetid condition. In such cases, it has a decided desiccative action in addition to its antiseptic properties.

It can be used dry (after excavating) on a little cotton wool, or mixed with a 1 in 2000 solution of Perchloride of Mercury. If with the latter, care should be taken, and the rubber dam applied, as in one case in which this mixture was tried, some of it spread to the gum, and severe inflammation followed. Whether this was due to some chemical combination such as an Iodide of Mercury being formed, the author has not yet been able to discover. In those successful cases where the two drugs were used, the presence of the Perchloride discounted the efficacy of the Airol. When, however, the drug has been used by itself, almost equally good results have been obtained, and after an application, if the cavity is properly sealed with Gutta Percha, it will be found in a day or two to be in a dry aseptic condition. It will also be noticed that the powder has changed from a greyish to a yellowish colour, and looks as though the cavity had been dressed with Iodoform, *minus* its odour. Its use as a method of treating dead teeth is still being considered, and a report of the experiments must of necessity be left for some future occasion.

From recent trials on chronic ulceration of the pulp, the author is of opinion that its action in such

cases is not unlike Pepsin, in producing a healthy condition of that organ, but a much longer time must be given for investigation before a definite opinion can be given. The drug, however, is well worth a good trial in dental surgery.

ARISTOL (not official)

Synonym.—Di-Thymol-Iodide.

Source.—It is obtained by mixing a solution of Iodine in Iodide of Potassium with an alkaline Thymol solution.

Characters.—It is a reddish-brown powder, which is insoluble in Water and Glycerine; soluble in Ether, Collodion, and Oils, and contains 45·8 per cent. of Iodine. It should not be heated or exposed to light.

Dental Therapeutics.—Being an antiseptic, it is used in the same manner as Iodoform, but is less powerful, although having Thymol in its composition certainly adds to its efficacy in this respect. It is said to act well on mucous and serous membranes, and is advocated as a dusting powder, in ulcerations of the lips and oral cavity. In such cases, it acts as a desiccative agent, and is not an irritant.

DI-IODOFORM (not official)

Ethylene Periodide, C_2I_4 .

This comparatively new drug is recommended as a substitute for Iodoform, as it is *almost* inodorous. It is a yellowish substance, insoluble in Water, slightly

soluble in Alcohol, and is susceptible to light, therefore it must be kept in a dark place. It contains more Iodine than Iodol or Aristol. Clinical trials, conducted in several of the Paris Hospitals during the past few years have shown it to be equally satisfactory in its use as Iodoform. It is prepared by Roberts and Co., New Bond Street, and has lately been introduced into Dental Surgery, but time is required to test its value as an antiseptic.

EUROPHEN (not official)

A yellow amorphous powder, containing 28 per cent. of Iodine. It only acts when brought into contact with secreting surfaces, which decompose it and liberate Iodine.

IODOL (not official)

Formula.— C_4HNI_4 .

Synonym.—Tetra-Iodo-Pyrrhol.

Source.—Made by precipitating Pyrrhol with Iodo-Iodide of Potassium.

Characters.—It is a light brown crystalline powder, which is insoluble in Water; soluble in Ether, Chloroform, and three parts of Alcohol, and more soluble in Absolute Alcohol. It is tasteless, and has no unpleasant odour like that of Iodoform.

Pharmacology.—It is an antiseptic, as it readily sets free Iodine, and its effects are similar to those of Iodoform.

Dental Therapeutics.—*As an Antiseptic.*—It is used in the form of Iodolized Wax, which should be applied to the roots of dead teeth, on wool or bibulous paper, wrapped round a Donaldson bristle, to which it does not stick. It melts at a lower temperature than Iodoform Wax.

As an Obtundent.—Iodol varnish is most useful applied to sensitive dentine, in cases where this tissue is soft in the neighbourhood of the pulp, and there is no occasion to remove it. An osteo filling on the top of the varnish, left in for six or twelve months, will materially assist in the formation of secondary dentine.

Dose.—1 to 3 grains.

NAPHTHOL (not official)

Formula.— $C_{10}H_7HO$.

Source.—A coal-tar derivative.

Characters.—White shining crystals with a faint odour. Soluble in Alcohol and Ether; insoluble in Water. There are two kinds, Alpha and Beta. The latter is employed medicinally on account of its less irritating and injurious action. *Hydronaphthol* is supposed to be a form of β -Naphthol.

Pharmacology.—It is an antiseptic, germicide, and disinfectant.

Dental Therapeutics.—*As an Antiseptic and Germicide.*— β -Naphthol and Hydronaphthol are used in the treatment of dead teeth. The latter is said to be non-irritant, non-poisonous, and non-corrosive. The

strength to be used to pulpless teeth, is a solution of 1 in 1000 of Water.

As a mouth-wash, after scaling in pyorrhœa alveolaris, the following can be used :

Hydronaphthol 20 grains.

Alcohol,

Water of each 1 ounce.

Use one teaspoonful in a little water three times daily.

PARAFFINUM MOLLE

SOFT PARAFFIN

Synonyms.—"Vaseline," Ung. Paraffinum, Petroleum Ointment.

Source.—Obtained by purifying the less volatile portions of Petroleum.

Characters.—A semi-solid, yellowish, greasy mass. Insoluble in Water. Is not saponified by solutions of alkalies. Melts at 95° to 105° Fahr.

Pharmacology.—It is used as a basis for ointments intended to have a *local* (antiseptic?) effect. It is emollient in its action.

Dental Uses.—It is a soothing application to cracked lips and excoriated surfaces of the gums. Is useful for dipping stopping instruments into, when filling with any of the osteoplastics, to prevent their adherence. Also for smearing over model composition when taking an impression, to facilitate its removal.

Hard paraffin is used for embedding specimens in Dental Microscopy.

PHENACETINUM

PHENACETIN

Formula.— $C_{10}H_{13}NO_2$.

Synonym.—Para-acet-phenetidin.

Source.—From Para-phenetidin by the action of Glacial Acetic Acid.

Characters.—Colourless glistening crystals, without taste or odour. Sparingly soluble in Water; 1 in 16 of Spirit.

Pharmacology.—It is an antipyretic, anodyne, and hypnotic. Is less depressant in its action on the heart than Phenazone.

General Therapeutics.—Given for the neuralgic pains of tabes dorsalis, herpes zoster, and in many pyrexial diseases.

Dental Therapeutics.—*As an Anodyne*, it is given in all forms of neuralgia, in doses of 5—10 grains, and is said to relieve toothache when inflammatory conditions are present.

Dose.—5 to 10 grains.

PHENAZONUM

PHENAZONE

Formula.— $C_6H_5(CH_3)_2C_3HN_2O$.

Synonyms.—Antipyrin, Phenyl-dimethyl pyrazolone.

Characters.—Colourless scaly crystals obtainable from Phenyl-hydrazine, which are odourless, but have

a bitter taste. Freely soluble in Water, Alcohol, and Chloroform; less so in Ether.

Pharmacology.—It is an antipyretic, nervine sedative, and anodyne. It is a great depressant of the heart's action, and has certain hæmostatic properties.

General Therapeutics.—Given in cases of fevers, pneumonia, and acute rheumatism, to reduce temperature, and in sciatica, lumbago, and migraine, to relieve pain.

Dental Therapeutics.—*As an Anodyne.*—It is given internally in doses of 10 grains, and used hypodermically (5 per cent. solution) in cases of neuralgia. It should always be administered with great care, on account of its being a cardiac depressant.

Dose.—3 to 20 grains.

Antidotes.—Keep the patient in a recumbent position, and give stimulants.

RESORCINUM (NOT OFFICIAL.)

RESORCIN

Formula.— $C_6H_4(HO)_2$.

Source.—A derivative of Carbohc Acid.

Characters.—White, tabular, lustrous crystals, with an odour of Carbohc Acid, and a sweet pungent taste. Soluble in Water, Alcohol, and Ether.

Pharmacology.—It is an antiseptic, disinfectant, antipyretic, and caustic.

Dental Therapeutics.—*As an Antiseptic.*—It is used for fœtid ulcers of the gums and mucous membrane.

The crystal itself can be employed for this purpose, as it has no irritating effect on mucous membranes. For pyorrhœa alveolaris, a 10 per cent. solution is recommended, after having previously washed out the socket with Peroxide of Hydrogen.

Dose.—1 to 30 grains in solution.

Antidotes.—Stomach-pump, emetics, white of egg, stimulants.

ORGANIC SUBSTANCES

ORDINIO BURSTANO

ORGANIC SUBSTANCES

ACIDUM BENZOICUM

BENZOIC ACID

Natural Order.—Styracaceæ.

Formula.— $\text{HC}_7\text{H}_5\text{O}_2$.

Source.—Prepared from Benzoin (a balsamic resin) by sublimation.

Characters.—It is in the form of white feathery crystals of a silky lustre, a peculiar odour, and warm acidulous taste.

Pharmacology.—It is an antiseptic, germicide, and preventive of fermentation and putrefaction. It is also a sialogogue, and expectorant. The efficacy of Friar's Balsam (the Compound Tincture of Benzoin) as a local application to wounds, is due to its power as an antiseptic.

Dental Therapeutics.—*As an Antiseptic and Germicide.*—It can be used for these purposes in the treatment of suppuration and ulceration of the pulp, by applying the dry powder, but its usefulness in this respect is decidedly inferior to other drugs. It is used as an ingredient of mouth-washes, as it has no deleterious effects on the teeth.

Dose.—10 to 15 grains.

Listerine (not official).

Description.—Is a clear amber-coloured liquid, with a slightly acid reaction, a fragrant aromatic odour, and a pungent taste. It contains Thyme, Eucalyptus, Baptisia, Gaultheria, Mentha Arvensis, and purified Benzo-boracic Acid.

Pharmacology.—It is a powerful non-toxic antiseptic, preventive of fermentation, and deodorant.

General Therapeutics.—Externally, it is used as a dressing for wounds and ulcerations; as a spray in ozæna, after preliminary cleansing with Bicarbonate of Sodium. Given internally, for dyspepsia and diarrhoea.

It is most useful in cases of severe illness, where the patient is unable to cleanse the mouth, to mop it round with a small sponge, on a sponge holder, which has been dipped in a weak solution of Listerine; or should the patient be able to use a feeding cup, a better result will be obtained by taking the solution into the mouth through the spout, rinsing the oral cavity, then closing the lips tightly on the spout and forcing the liquid back into the cup. These directions apply not only to this drug, but to any mouth-wash of an antiseptic nature.

Dental Therapeutics.—*As an Antiseptic.*—It is most useful as a mouth-wash for all affections of the oral cavity, in the strength of 2 drachms or more to 2 ounces of Water. As a prophylactic agent, it should be used for temporary teeth with a tooth-brush. It has been used in full strength for the treatment of dead teeth, but its germicidal power is not very strong, being but equal to a 5 per cent. solution of Carbolic

Acid. One of its advantages for this purpose is that it is a non-coagulant and non-toxic. Its use as a mouth-wash should always be advocated to those who wear bridge work.

In cases of fracture of the jaw, where the patient is unable to open the mouth, syringe out frequently during the day with a weak solution.

Dose.—1 drachm diluted.

ACIDUM GALLICUM

GALLIC ACID

Natural Order.—Cupuliferæ.

Formula.— $\text{H}_3\text{C}_7\text{H}_3\text{O}_5, \text{H}_2\text{O}$.

Source.—Made by boiling one part of powdered galls, with four fluid parts of Dilute Sulphuric Acid for half an hour, straining, and purifying the crystalline product.

Characters.—Small, silky, fawn-coloured crystals, with a slightly acid and astringent taste; sparingly soluble in cold Water; soluble in hot Water, Glycerine, and Alcohol.

Pharmacology.—It is an internal astringent and styptic. Its local action is inferior to Tannic Acid, but as a remote astringent it is more powerful than an equal part of this latter drug, as Tannic Acid becomes converted in the blood, into Gallic Acid and grape-sugar, and hence only part of it is available.

General Therapeutics.—Given chiefly for its astringent properties, in arresting all kinds of internal hæmorrhage, but is inferior to Ergot for this purpose.

Dental Therapeutics.—*As an Astringent.*—In some obstinate cases of alveolar hæmorrhage, where the administration of Ergot is contra-indicated, the following prescription will often prove efficacious:

Gallic Acid	60 grains.
Dilute Sulphuric Acid . . .	1 drachm.
Tincture of Opium	1½ drachms.
Water to	6 ounces.

Two tablespoonfuls every two hours until the bleeding stops.

The same precautions should be taken as described under Iron (see p. 96).

As a mouth-wash it may be used in inflammation of the oral cavity, but Tannic Acid is preferable.

Dose.—2 to 10 grains.

ACIDUM SALICYLICUM

SALICYLIC ACID

Natural Order.—Salicaceæ.

Formula.— $\text{HC}_7\text{H}_5\text{O}_3$.

Preparation.—It is obtained from the natural Salicylates, such as the Oil of Winter-green; or by the combination of the elements of Carbolic Acid, with those of Carbonic Acid Gas, and subsequent purification.

Characters.—It is generally seen in the form of small white crystals, which are odourless, and have a sweetish taste at first, which afterwards becomes acid. It is only slightly soluble in Water, readily so in

Alcohol, Ether, and hot Water. It is often impure, and either the "natural" or the purified Acid should be employed.

Pharmacology.—It is an antiseptic, disinfectant, errhine, sialogogue, antipyretic, and anodyne. It has a strong affinity for Lime, therefore its long administration may seriously affect the bones and teeth. Tannic Acid interferes with its action, therefore these two drugs should not be used together.

It is often mixed with drugs such as Cocaine, as it arrests putrefaction, and prevents the development of bacteria. A 1 per cent. solution arrests the action of ptyalin on starch.

General Therapeutics.—It is given in doses of from 15 to 20 grains to reduce the temperature of fevers, in acute rheumatism, and sore throat of rheumatic origin. Great care should always be taken when using this drug, as it is a depressant of the heart's action.

Dental Therapeutics.—*As an Antiseptic.*—It is employed for this purpose in the treatment of suppurating and gangrenous pulps, by introducing the dry powder into the pulp cavity, and allowing it to remain a few days; or it may be used as an Ethereal solution. By dental authorities it is said to be inferior to Carbolic Acid. For inflamed conditions of the mouth and gums, it is useful in the form of a solution, with equal parts of powdered Cassia or Cinnamon, applied with a brush.

Dose.—5 to 30 grains.

ACIDUM TANNICUM

TANNIC ACID

Natural Order.—Cupuliferæ.

Formula.— $C_{27}H_{22}O_{17}$.

Synonym.—Tannin.

Source.—Made by exposing powdered Galls to a damp atmosphere for three days; macerating with Ether and Water; separating the liquid portion by pressure, partially evaporating, and drying the same.

Characters.—Vesicular glistening masses, or scales, which are of a yellowish-white colour and strongly astringent taste. Soluble in Water, Rectified Spirit, and Glycerine; sparingly so in Ether.

Pharmacology.—It is the most powerful local vegetable astringent we have, on account of its action on albumen and gelatine, which in a *secondary* manner causes constriction of the blood-vessels, and so acts as a styptic. As a matter of fact Tannic Acid dilates blood-vessels, but its constringent action on the surrounding tissues completely overcomes any dilatation. It has also some disinfectant, and obtunding properties, and is a desiccative.

General Therapeutics.—It is used chiefly as a local application to stop hæmorrhages and profuse secretions, from different parts of the body.

Dental Therapeutics.—*As an Astringent and Styptic.*—For inflamed and ulcerated conditions of the mucous membrane of the oral cavity, Tannic Acid in various degrees of strength is most useful.

As an example :

Tannic Acid	.	.	1 to 2 drachms.
Rectified Spirit	.	.	1 drachm.
Rose Water	.	.	to 10 ounces.

To be used as a mouth-wash frequently.

The same prescription, with or without the addition of such drugs as Tincture of Iodine, Tincture of Myrrh, Alum, Glycerine, or Boracic Acid, according to the state of any individual case, can be used for mercurial salivation, spongy gums, hypertrophy of the gums, and Rigg's disease.

Should an astringent dentifrice be required, the following will answer most purposes :

Precipitated Chalk	.	.	2 ounces.
Tannic Acid	.	.	30 grains.
Oil of Cloves	.	.	3 drops.

For inflamed and ulcerated conditions of the pulp, a mixture of Tannic Acid 1 drachm, and sufficient Creasote to make a paste, either with or without Acetate of Morphine or Cocaine, will be found most serviceable when applied with care, and pressure on the pulp is prevented. This will reduce inflammation and subsequent pain, before applying Arsenic to devitalise.

The Glycerine of Tannic Acid is a useful application to inflamed and relaxed conditions of the uvula and fauces, by painting them twice a day with a proper throat brush.

As a Styptic.—Many dentists use this drug in preference to any other, for stopping alveolar hæmorrhage after tooth extraction. In such cases, the procedure both before, and after, the application of Tannic Acid,

is the same as with all styptics (see Iron). Whenever the author uses this drug for alveolar hæmorrhage, he prefers it in the form of *Styptic Colloid* (a saturated solution of Tannic Acid and gun-cotton in Ether), which, after removal of clots, &c., is applied with a camel's-hair brush in simple cases, but in more severe cases the sockets must be plugged, and pressure applied.

As an Obtundent.—Combined with Creasote it has been used for the relief of sensitive dentine, but for this purpose it must be left in several days, and the cavity hermetically sealed.

As a Desiccative.—After the application of Arsenic to a pulp, and when the pulp chamber has been opened up, a dressing of Tannic Acid may be left in for a few days, which will harden the pulp and facilitate its removal.

Dose.—2 to 10 grains.

ACONITUM

ACONITE

Natural Order.—Ranunculaceæ.

The preparations of Aconite used by dentists are the Tincture, the Liniment, and occasionally the Alkaloid, Aconitine. The two former are prepared from the leaves and flowering tops of the *Aconitum napellus*, the latter from the root.

Pharmacology.—The Tincture is an anodyne, sedative, obtundent, local anæsthetic, and antipyretic.

When taken internally, it first produces a tingling

sensation on the lips and tongue, and this is followed by numbness, which may or may not extend to the extremities. It produces a sense of warmth in the stomach, and reduces the frequency, force, and tension of the pulse, a steady fall of temperature occurs, and respiration becomes slow and irregular. It is a great cardiac depressant, therefore when using it, the pulse should be carefully watched.

Applied *locally*, both the Tincture and the Liniment act as sedatives to the peripheral ends of sensory nerves, and have a distinct effect in controlling inflammatory action.

The Alkaloid is a sedative poison.

Symptoms of Poisoning.—Sense of fatigue, muscular weakness, dimness of vision, dilated pupils, short and laboured respiration, pulse slow and small, afterwards imperceptible, paralysis, and death.

General Therapeutics.—It is given internally for all painful diseases, such as gout, sciatica, rheumatism, neuralgia, &c. Also in fevers and pneumonia, to reduce the temperature. Externally, it is applied as an anodyne.

Dental Therapeutics.—*As an Anodyne, Local Sedative, and Obtundent.*—Combined with equal parts of either the Tincture or Liniment of Iodine, it is used for the relief of dental periostitis by painting the mixture over the affected part with a camel's-hair brush (see Iodine). This preparation can also be painted on the gum which has been rendered tender during separation of teeth. The Tincture will often relieve the pain of toothache of sensitive dentine, if a drop or two is introduced into the cavity.

The Liniment is a useful application for neuralgia, particularly when combined with Belladonna and Chloroform in the following proportions :

Liniment of Aconite	.	.	7 drachms.
Liniment of Belladonna	.	.	7 „
Chloroform	.	.	2 „

Mix. Apply on lint to the affected part, and cover with a piece of sponge or flannel, saturated in hot water. Care must be taken, when using it on the face, not to allow any to get into the eye. It should be labelled "Poison."

The following is recommended by Dr Murrell as a good formula, for a neuralgia liniment :

Aconitine (B. P.)	.	.	1 grain.
Essential Oil of Mustard	.	.	1 drachm.
Glycerine	.	.	1 ounce.
Rectified Spirit	.	.	to 6 ounces.

For external application only. Label "Poison."

As a Local Anæsthetic.—Combined with other drugs such as Chloroform, Chloral, Pyrethrum, Morphia, &c., it can be applied to the gums previous to the extraction of teeth.

Antidotes.—Stomach-pump. Heat, Brandy, Ammonia, emetics, subcutaneous injection of Atropine ($\frac{1}{50}$ grain). Digitalis, Nitrite of Amyl, artificial respiration.

Dose.—1 to 15 minims. Fleming's Tincture is about six times as strong as that of the B. P. Fifteen-minim doses of Tincture of Aconite are rarely required, and should be prescribed with caution. One-minim doses frequently, will answer every purpose.

BELLADONNA

Natural Order.—Atropaceæ.

Description.—The leaves and roots of the *Atropa belladonna*, or deadly nightshade, are used in the various preparations of Belladonna, and these are as follows:

From the leaves—

The Extract, Juice, and Tincture.

From the roots—

The Alcoholic Extract, from which are made the Plaster.

Ointment.

Liniment.

The alkaloid Atropine.

Pharmacology.—It is a local anæsthetic, anodyne, antispasmodic, anhidrotic, and depressant of the heart's action. After moderate doses, it will cause dryness of the mouth and throat, with difficulty of swallowing, and dilatation of the pupils; with a full dose, the pulse is reduced in frequency (at first), delirium occurs, and a rash resembling scarlet fever appears.

General Therapeutics.—It is used as a local application in all forms of neuralgia, acute gout, boils, erysipelas, and superficial inflammations.

Given internally, to relieve the symptoms of chorea, epilepsy, and megrim; to check the night sweats of phthisis, and relieve cough.

Dental Therapeutics.—*As an Anodyne and Antispas-*

modic.—Its use to the dentist is as an application to any abscess about the face, more particularly in the parotid region; also in those cases of alveolar abscess which have been allowed to nearly burst. In such cases the local application of the following may be prescribed:

Extract of Belladonna	2 drachms.
Glycerine	4 „

To be made into a paint. Apply to the inflamed part, and cover with spongio-piline or a piece of flannel which has been soaked in hot water. This will quickly cause the abscess to “point.” Combined with this treatment, attention must be paid to the state of the bowels, and aperients given. The abscess should then be lanced, and not allowed to break, which will prevent an unsightly scar, a point of great importance, more particularly in a female patient.

In cases of enlarged and inflamed glands of the neck, whether of dental origin or not, the application of the Glycerine and Belladonna paint will be found most efficacious, and should be combined with the internal administration of Sulphide of Calcium. In some instances, this mode of treatment will avoid the bursting of the abscess, and cause the contents to be re-absorbed.

Belladonna is useful too as a liniment, in cases of neuralgia, combined with Chloroform and Aconite in the following proportions:

Liniment of Belladonna,	
Tincture of Aconite (Fleming's) of each	6 drachms.
Chloroform	4 „

Mix. To be applied to the painful part, on lint or flannel.

Antidotes.—Stomach-pump, emetics, stimulants, coffee, Morphine, artificial respiration.

Doses.—Of the Extract, $\frac{1}{4}$ to 1 gr.; of the Juice, 5 to 15 minims; of the Tincture, 5 to 20 minims.

CAMPHORA

CAMPHOR

Natural Order.—Lauraceæ.

Formula.— $C_{10}H_{16}O$.

Source.—A stearoptene, obtained from the wood of *Cinnamomum camphora*.

Characters.—White, translucent, crystalline masses, which have a pungent odour, and are very tough. It is soluble in Spirit, Ether, and Chloroform; only slightly so in Water. Sp. gr. .990.

Pharmacology.—It is an anodyne, nerve sedative, obtundent, weak antiseptic, and sialogogue.

General Therapeutics.—Given in various nervous disorders, such as insanity, hysteria, whooping-cough, inflammation of the brain, and delirium tremens. Used externally as a liniment.

Dental Therapeutics.—*As an Obtundent and Anodyne.*—The Spirit is used to relieve the pain of sensitive dentine. Applied to cavities where the pulp is almost exposed, it allays odontalgia.

Combined with Chloroform in the proportion of Camphor, 1 drachm, Chloroform, 2 drachms, and applied with a camel's-hair brush, it will often relieve the excessive pain following the extraction of those

teeth which have been previously affected with periodontitis.

It is sometimes used as a local anæsthetic, before extraction, combined with Ether in the same proportion as Chloroform. This should be applied to the gum on cotton wool, on each side of the tooth to be extracted, until the gum becomes blanched.

It is used with other drugs, such as Cocaine, Chloral Hydrate, or Chloroform, as a liniment in neuralgia. The following preparation, introduced by Dr Murrell, is used at Westminster Hospital for this purpose :

Chloral Hydrate,

Menthol,

Thymol, of each . . . 1 drachm.

Camphor . . . 3 drachms.

Rub the ingredients together till liquefied, and paint the affected part with a brush.

Other Dental Uses.—It is one of the ingredients of celluloid base.

Dose.—1 to 10 grains.

Monobrated Camphor is given by some, for the convulsions of teething in 1-grain doses, but it is apt to irritate the stomach.

CAPSICI FRUCTUS

CAPSICUM FRUIT

Natural Order.—Solanaceæ.

Synonym.—Cayenne pepper, Guinea pepper.

Source.—The dried ripe fruit of the *Capsicum fastigiatum*.

Characters.—Oblong, conical, orange-red pods about $\frac{1}{2}$ to $\frac{3}{4}$ inch long, which contain seeds.

Preparation.—Tinctura Capsici.

Pharmacology.—Internally, it is a stimulant, carminative, and pungent stomachic. Externally, it is a counter-irritant, and local stimulant.

General Therapeutics.—Given for dyspepsia, especially in alcoholic subjects, sore throat, relaxed uvula, and chronic inflammation of the fauces.

Dental Therapeutics.—*As a Counter-irritant.*—It is used in cases of acute dental periostitis, a very convenient method being in the form of plasters (Seabury and Johnson's). The gum should be dried, and a piece of the plaster cut to a convenient size, pressed for a few minutes on the gum over the root of the affected tooth, and left on till the pain disappears.

As a Local Stimulant.—In pyorrhœa alveolaris after scaling, it is most useful combined with Aromatic Sulphuric Acid (see page 61).

In all chronic inflammatory states of the mouth and gums, it can be used as a mouth-wash, in the strength of $\frac{1}{2}$ ounce of the Tincture to 8 ounces of Rose Water.

Dose.—Of the Tincture, 2 to 10 minims.

CATECHU

CATECHU

Natural Order.—Cinchonaceæ.

Description.—An extract from the leaves and shoots

of the *Uncaria Gambier*. Is seen in the form of cubes, which are separate or agglutinated. No odour; taste bitter and astringent at first, then sweetish.

Preparations.—The Infusion, the Compound Powder, the Tincture, the Lozenges.

Pharmacology.—It is both a local and remote astringent. It acts like Tannic Acid, and is used for the same purposes. Some prefer one, some the other. The difference between them is, Tannin is a glucoside and Catechu is not.

General and Dental Therapeutics.—*As an Astringent.*—It is used in cases of sore throat in the form of the Lozenge; the Compound Powder and the Tincture are given internally for diarrhœa. As a mouth-wash, in cases of spongy gums, the Tincture can be used in the strength of 2 to 3 drachms to 1 ounce of Water, or a prescription can be written, similar to the one on page 189, by leaving out the *Krameria* and substituting *Catechu*.

Doses.—Of the Infusion, 1 to 2 fluid ounces; of the Tincture, $\frac{1}{2}$ to 2 fluid drachms; of the Compound Powder, 20 to 40 grains; of the Lozenges, 1 to 6.

COCAINÆ HYDROCHLORAS

HYDROCHLORATE OF COCAINE

Natural Order.—Erythroxylaceæ.

Formula.— $C_{17}H_{21}NO_4.HCl$.

Synonym.—Methyl-benzoyl-ecgonin.

Source.—Obtained by agitating with Ether an aqueous solution of an acidulated Alcoholic extract of Coca (the dried leaves of the *Erythroxylon coca*), made alkaline with Carbonate of Sodium, separating and evaporating the Ethereal liquid, purifying the product by repeating the treatment, decolourising, neutralising with Hydrochloric Acid, and re-crystallising.

Characters.—Colourless crystals, soluble in Water, Alcohol, and Glycerine; almost insoluble in Ether. It has a bitter taste, no smell, and causes a tingling sensation on the tongue. The alkaloid (Cocaine) is soluble in fats and oils. Its salts are not.

Pharmacology.—It is a local anæsthetic, obtundent of sensitive dentine, stimulant, tonic, and restorative. Its action as a local anæsthetic is supposed to be due to the effect it has on the vaso-motor nerves, which become paralysed, the constricted condition of the blood-vessels being very evident from the blanching which takes place. According to some authorities, these effects are due to its influence on the sympathetic. It also acts on the nerves of special sense, as is seen if applied either to the mucous membrane of the nose or tongue, when there is loss of smell or taste. Solutions of this drug should be freshly made, as fungi form in them if they are kept, which considerably alter their pharmacological action. This, however, can be prevented to a large extent by the addition of a little Salicylic Acid, or by using the "tabloids."

Toxic Symptoms.—Pallor of the skin, headache, giddiness, faintness, weak pulse, prostration, great

mental excitement, epileptiform convulsions. The symptoms, however, vary in different cases, some patients stating that the sensations they had passed through, after an injection for tooth extraction, were awful. These bad effects, however, have been attributed to impurities in the drug.

General Therapeutics.—In aqueous solutions of 2 to 20 per cent., it is used as a local anæsthetic for some of the operations on the eye, nose, ear, throat, teeth, rectum, vagina, and urethra. It is given internally to prevent sea-sickness, for gastralgia, &c. In acute tonsillitis, a 4 per cent. solution should be used, and if this is applied every hour, the pain and difficulty in swallowing are speedily removed (Murrell).

In psoriasis of the tongue, a 10 per cent. solution painted thereon before meals relieves the pain of the passing food.

For relaxed and sore throats, the Rhatany and Cocaine lozenges afford great relief.

In supra-orbital neuralgia, relief has been obtained by rubbing in a 10 or 20 per cent. solution of the Alkaloid with Oil of Cloves.

Dental Therapeutics.—*As a Local Anæsthetic and Obtundent.*—Despite the various accidents, unpleasant symptoms, and fatalities which have ensued, it is still used by dentists for relieving the pain of tooth extraction. The author's opinion is that, whilst we have an anæsthetic so safe and thoroughly reliable as Nitrous Oxide Gas, no one is justified in using the Hypodermic Injection of Cocaine, which is not only unreliable at times, but in many cases unsafe. One of its advantages (?) is that the patient does not lose consciousness, but

this is discounted by the horror of the sight of the instruments, and also by his knowing what is being done.

The following is the method when using this drug as a Hypodermic Injection in tooth extraction :—The quantity to be injected is from $\frac{1}{2}$ to 1 gr. (best kept in the form of tabloids), and this should be placed in a test-tube to which warm water should be added, and 10 minims of the solution *carefully drawn, i. e.* without air, into the syringe. The needle should then be introduced into the gum in a vertical direction, care being taken not to blunt its point against the alveolus, and the fluid injected slowly. Should any resistance to the piston of the syringe be felt, the needle must be slightly withdrawn and moved in the gum tissue. The injection must be done on each side of the tooth, and an interval of ten minutes allowed to elapse before extraction takes place. The gum should be pricked just previous to the operation, to see that it is thoroughly anæsthetised.

For obtunding sensitive dentine, the author has found it fairly successful, and he prefers to use it dry. For this purpose the rubber dam should be applied, and the cavity thoroughly dried with hot air, and part of a tabloid broken up, inserted, and allowed to remain ten minutes before excavating.

In cases of slightly exposed pulps which require free exposure before applying Arsenic, the above method can also be used.

Some of the devitalising agents contain Cocaine, which considerably alleviates the pain caused by the Arsenic.

Cocaine itself is said to temporarily relieve tooth-

ache when mixed with Oil of Cloves, a Mastich dressing being applied. The latter drug would, in all probability, have a considerable share in giving relief. The Alkaloid is preferable to any of its salts for this purpose, as it is only slightly soluble in water, and is less likely to be washed away by the saliva.

The Salts of Cocaine have now quite superseded Bromide of Ammonium and other drugs, for painting the soft palate and tissues adjacent, when a model has to be taken, and retching and vomiting occur. Its efficacy is more particularly shown in cases of cleft palate.

A 4 per cent. solution on cotton wool, when applied to the gum and allowed to remain five minutes, is useful for deadening the pain of the insertion of the forceps. In cases of scaling, and before applying the rubber dam, the 4 per cent. solution will minimise pain. An ointment of Lanolin and Cocaine, rubbed into the gums with a buff point on the Dental Engine, has also been found useful for this purpose.

Dose.— $\frac{1}{5}$ to 1 gr.

Antidotes.—Inhalations of Nitrite of Amyl, administration of cardiac stimulants, and artificial respiration.

Eucaïne Hydrochlorate.

Formula.— $C_{19}H_{27}NO_4, HCl$.

Pharmacology.—This is a new local anæsthetic, and has been introduced into dental surgery by Dr Kiesel, of Berlin. He claims the following advantages for it, over Cocaine, as an injection for relieving the pain of tooth extraction :

1. The heart's action is not affected in any way.

2. Anæsthesia is prolonged, both as regards time and locality.

3. The patient can tolerate an injection of 30 grains without injury.

4. Solutions made in the strength of 1 part of Eucaine to $6\frac{1}{2}$ parts of sterilised Water remain quite clear at the temperature of the room, and do not become flocculent on the addition of Carbolic or Salicylic Acid.

5. Its comparative cheapness.

Dental Therapeutics.—It has been used with success by Dr Kiesel as a local anæsthetic during the extraction of teeth. He injects $1\frac{1}{2}$ to 2 c.c. of the solution about one third of an inch from the tooth to be extracted, and uses a Pravaz syringe. The surrounding parts should be previously cleansed with dilute Carbolic Acid to prevent any septic mischief arising.

It has also been used with advantage as a substitute for Cocaine in Arsenical pastes.

COLLODIUM

COLLODION

Natural Order.—Malvaceæ.

Synonym.—Contractile Collodion.

Source.—Made by dissolving one part of Pyroxylin (gun-cotton) in a mixture of 12 ounces of Rectified Spirit and 36 ounces of Ether.

Characters.—It is a colourless, syrupy, and very inflammable fluid, with a strong odour of Ether.

When applied to any surface, it quickly dries, leaving a thin contractile film, which is insoluble in Water or Alcohol. If, when in bottle, it becomes too thick, it can always be diluted by adding a mixture of Ether 3 parts, Rectified Spirit 1 part.

Preparation.—Collodium Flexile, which is made by adding 20 grains of Canada Balsam, and 10 minims of Castor Oil, to 1 ounce of Collodium.

Dental Therapeutics.—It is a very useful application, to prevent an alveolar abscess from bursting on the face. It should be painted with a camel's-hair brush over the abscess, in several layers, and it then acts as a compress. In many cases it will either bring about absorption of the pus, or cause the abscess to open in the mouth. This form of treatment should be combined with the internal administration of Sulphide of Calcium.

Other Dental Uses.—It is one of the drugs used in Dental Microscopy, to assist in obtaining sections of hard and soft tissues together.

In the workroom, it is used, when not too thick, to coat plaster models.

ERGOTA

ERGOT

Natural Order.—Graminaceæ.

Description.—The sclerotium of the *Claviceps purpurea* (a fungous growth), produced between the pales, and replacing the grain, of *Secale cereale*, the Rye.

Characters.—It occurs in grains about an inch in

length, which are longitudinally furrowed, and have a disagreeable odour and taste.

Preparations.—The Liquid Extract, the Infusion, the Tincture, Ergotin, and the Hypodermic Injection. The last-named is best made as required. It consists of one part of Ergotin (which is a purified extract and *not* an alkaloid) dissolved in two parts of Camphor Water.

Pharmacology.—From a Dental point of view, its chief use is as a hæmostatic, as under its influence the arteries and arterioles become distinctly smaller, the latter becoming closed, and the heart's action reduced in frequency. Its action on the spinal cord and uterus would be out of place in a work of this kind, but slight reference to the latter is noted under Dental Therapeutics.

General Therapeutics.—It is employed in all forms of hæmorrhages whether from the lungs, stomach, intestines, or uterus; also in parturition. In severe cases of hæmorrhage, 2-drachm doses of the Liquid Extract can be given every hour or oftener (Murrell).

Dental Therapeutics.—*As a Hæmostatic.*—In some cases of alveolar hæmorrhage, after all local applications such as Iron, Tannic Acid, Matico, &c., have failed, Ergot is of the greatest service, especially if it is noticed that the blood after leaving the socket rapidly coagulates. This shows a want of contractile power in the coats of the artery or arteries, and in such cases Ergot is invaluable, and should be given as follows:

Liquid Extract of Ergot	.	1½ drachms.
Dilute Sulphuric Acid	.	40 drops.
Water	.	to 4 ounces.

Order two tablespoonfuls to be taken every half-hour till the bleeding ceases. Or it may be administered hypodermically, in which case a freshly made preparation of Ergotin should be used, and 3 to 10 minims injected deep into the muscles, and not just beneath the skin as in ordinary hypodermic injections, as it is likely to produce irritation. These two methods may be combined; if so, the mixture should be ordered less frequently, viz. about every three hours. The Ergotin "tabloids" are also a convenient method of administering the drug; each "tabloid" contains three grains of Ergotin, which should be completely dissolved in a little hot water or swallowed entire.

This drug should not be given to restrain alveolar hæmorrhage if the patient be pregnant.

Doses.—

Liquid Extract	.	15 to 30 minims.
Ergotin	.	2 to 5 grains.
Hypodermic Injection	.	3 to 10 minims.

Antidotes.—Stomach-pump or emetics, Tannic Acid, stimulants; the recumbent position and warmth to the extremities.

GELSEMIUM

YELLOW JESSAMINE

Natural Order.—Loganiaceæ.

Description.—The dried rhizome and rootlets of *Gelsemium sempervirens*, the former being nearly cylindrical in shape, and having the rootlets attached or not. Odour narcotic and aromatic; taste bitter.

Composition.—It contains a powerful alkaloid, Gelsemine, Gelseminic Acid, a volatile oil, and other ingredients.

Preparations.—The Alcoholic Extract and the Tincture.

Pharmacology.—It is a great depressant of both the heart and nervous centres, especially of the motor parts of the cord. It is also an anodyne.

General Therapeutics.—It is given in cases of migraine, neuralgia, tetanus, asthma, and whooping-cough.

Dental Therapeutics.—*As an Anodyne.*—According to some authorities it is a great remedy for neuralgia of the fifth nerve associated with carious teeth, but Chloride of Ammonium and Butyl-chloral Hydras are generally more effective. It can be ordered in doses of 10 minims of the tincture every two hours, but a safer method is to give three or four drops every half-hour. Some advocate 20 minims every one and a half hours, and repeat the dose up to three doses, and if this fails to relieve the pain, to stop, as a further quantity would do no good, and might lead to ill effects. Others recommend 15 minims for a dose, with the addition of 5 grains of Sulphate of Quinine. During its administration it is necessary that the symptoms be watched, owing to its poisonous nature. The Alkaloid has been used in doses of $\frac{1}{30}$ of a grain three times a day without any evil effects.

Doses.—

Of the Alcoholic Extract	.	$\frac{1}{2}$ to 2 grains.
„ „ Tincture	. . .	5 to 20 minims.
„ „ Gelsemine	. . .	$\frac{1}{60}$ to $\frac{1}{20}$ grain.

Symptoms of Poisoning.—Headache, vertigo, double vision, paralysis of the ocular and levator palpebræ muscles, laboured respiration which ultimately fails, and unsteady gait. Death occurs from asphyxia.

Antidotes.—Stomach-pump, or emetics if seen early, stimulants, hypodermic injection of Atropine $\frac{1}{50}$ grain, artificial respiration.

GLYCERINUM

GLYCERINE

Natural Order.—Oleaceæ.

Formula.— $C_3H_5(OH)_3$.

Source.—Obtained by the saponification of fats and fixed oils, and contains a small percentage of water.

Characters.—It is a colourless, inodorous fluid, with a sweet taste; it is freely soluble in Water and Alcohol. Sp. gr. 1.250.

Preparations.—There are many pharmaceutical preparations of Glycerine, those of dental importance are—

Glycerinum Acidi Carbolici,
Glycerinum Acidi Gallici,
Glycerinum Acidi Tannici,
Glycerinum Aluminis,
Glycerinum Boracis.

Pharmacology.—It is a solvent, emollient, laxative, demulcent, and nutritive. It has also antiseptic properties. The “glycerines,” or “glycerites,” as they should more properly be called, act powerfully upon

the parts to which they are applied, as Glycerine is readily miscible with aqueous fluids.

General Therapeutics.—*Externally*, it is used as an emollient for chapped hands and face, fissures of the lips, bedsores, &c. Dr Donkin recommends an application of Salol in Glycerine (1 drachm to 1 ounce) to affected parts in infantile stomatitis, by means of a brush, combined with the internal administration of Chlorate of Potassium or Sodium.

Internally, it is sometimes given as a *nutritive* instead of Cod-liver Oil in phthisis, but its use for this purpose is uncertain. It is employed to sweeten nauseous mixtures.

Dental Therapeutics.—*As a Solvent and Emollient.*—Combined with Chlorate of Potassium, Borax, Carbolic, Tannic, and Gallic Acids, it is of great service in all inflammatory conditions of the mucous membrane of the mouth and throat. In tonsillitis it should always be prescribed with whatever drug is ordered, for its emollient effects. In the aphthæ of infants the following is a good preparation to use, before resorting to the application of Nitrate of Silver:

Sulphite of Sodium 30 grains.

Glycerine,

Water, of each 1 ounce.

To be used on cotton wool or with a camel's-hair brush every two hours.

It should always be remembered, when using Carbolic Acid for the relief of sensitive dentine, that the solution should *not* be made with Glycerine, as it would be liable to increase the pain.

Other Dental Uses.—Employed in Dental Microscopy,

when diluted, for mounting objects. As it dissolves Carbonate of Lime, it should be avoided when making sections of calcified structures.

It is also recommended for "boiling up" celluloid dentures in preference to oil.

Dose.—1 to 2 drachms.

GOSSYPIUM

COTTON WOOL

Natural Order.—Malvaceæ.

Description.—The hairs of the seed of the *Gossypium herbaceum* and other species of *Gossypium*, from which fatty matter and all foreign impurities have been removed.

Preparation.—Pyroxylin (gun-cotton).

Uses.—It is employed both in general and dental surgery with various drugs, such as Carbolic Acid, Salicylic Acid, Boracic Acid, Eucalyptus, Iodoform, Bichloride of Mercury, Perchloride of Iron, &c., by simply saturating the cotton with a solution of either drug, and exposing to the atmosphere to dry. Lawton's Absorbent Cotton Wool is the best. This possesses a beautiful downy flocculence, and will absorb fourteen times its own weight of blood, water, or pus.

It also acts as a *mechanical* styptic when applied to a wounded surface. In conjunction with various gum-resins it is used as a temporary stopping, and with antiseptics as a root filling. It is also a means of separating teeth. Richmond's Cotton Wool

Pellets are a convenient form for use, and save the time of the operator. They are made in four sizes.

GUTTA PERCHA

GUTTA PERCHA

Natural Order.—Sapotaceæ.

Description.—The concrete juice of the *Dichopsis gutta* and other trees of the same order, and is seen in the form of light brown pieces, which are tough and flexible. It is insoluble in Water and Alcohol; almost soluble in Chloroform; entirely so in Oil of Turpentine, Carbon Di-sulphide, or Benzol.

Dental Uses.—Combined with Silica and other substances it forms a plastic material for filling teeth. Various kinds are used for this purpose, viz. Hill's, Gilbert's, White's, and Jacobs'. The first two should only be used as temporary fillings for holding in various forms of dressings, as they do not last; whilst White's and Jacobs', particularly the latter, in *suitable* cavities will compare favorably with many of the so-called permanent stoppings. It is certainly to be preferred in many cases to the Oxychloride or Oxyphosphate fillings, but the same care is required for preparing the cavity and plugging as with gold, such as:

1. Keep the cavity dry.
2. Make anchorages to retain the filling.
3. Use only small pieces at a time.

4. Discard pieces which have been burnt in the spirit lamp.

5. Do not introduce the first two or three pieces too hot, or they will cause pain.

6. Mop out the cavity first of all with Chloroform, or a solution of Gutta Percha in Chloroform, to secure adhesion.

7. Finish off the filling with cold instruments slightly greased.

In teeth where the decay extends below the gum, it is most useful for filling up the cavity to just beyond the gum margin, the operation being completed with an osteo. In certain cases of decay where the saliva is very acid, and where gold cannot be adapted, it is much more preferable to the osteoplastics, which would quickly wash out. In crown cavities, or those exposed to friction, Gutta Percha fillings are of no use, as they wear away.

It is a perfect non-conductor, but however carefully applied it does not make an absolutely watertight filling.

A solution of Gutta Percha in Chloroform makes an excellent cap to an exposed pulp, which is non-irritating and protective; and the same solution forms an efficient material for filling the roots of dead teeth after they have been rendered aseptic.

It is useful for separating back teeth by inserting a piece into the cavity and leaving a slight excess for the patient to bite on. In separating front teeth strips of tape or rubber are generally used at first. These cause in a few hours great tenderness, especially the latter substance, and the patient is unable to

bear any operation. By replacing the tape or rubber with a piece of Gutta Percha and waiting a few days, all tenderness disappears, and the tooth is able to be prepared and stopped.

Other Dental Uses.—It is also used for taking impressions of the mouth and making interdental splints.

HAMAMELIS.

Natural Order.—Hamamelaceæ.

Synonyms.—Witch Hazel, Winter Bloom.

Description.—The dried bark and leaves of the *Hamamelis virginica*, the former being in the form of quills, or slightly curved pieces 2 to 8 inches long and $\frac{1}{10}$ inch thick, and the latter 4 to 6 inches long, oval or obtuse in shape, and toothed in the margin. Both have an astringent and bitter taste, and contain Tannic Acid, bitter, and odourous matters.

“*Hazeline*”—Is the volatile active principle distilled from the green leaves and twigs of the Witch Hazel (*Hamamelis virginica*). It is a colourless aromatic fluid.

Preparations.—The Tincture and Liquid Extract. “*Hazeline*” is unofficial.

Pharmacology.—It is an astringent and hæmostatic, both locally and remotely. It has no poisonous action.

General Therapeutics.—It is useful in hæmorrhages from the nose, lungs, bowels, or uterus; also for diarrhœa and hæmorrhoids. For the latter it is given internally, and applied externally as an ointment.

Dental Therapeutics.—*As an Astringent and Hæmodynamic.*—It is used by some as a mouth-wash in cases of tender spongy gums, aphthæ, and stomatitis, in the proportion of 1 ounce of the Tincture to 10 ounces of Water.

For hæmorrhage after extraction it can be applied locally, and given internally in doses of $\frac{1}{2}$ drachm of the Tincture every three hours.

Doses.—

Of the Tincture . . .	5 to 60 minims.
„ Fluid Extract . . .	2 „ 5 „
Hazeline . . .	1 „ 4 drachms.

KRAMERIÆ RADIX

RHATANY ROOT

Natural Order.—Polygalaceæ.

Description.—The dried root of Peruvian Rhatany, *Krameria triandra*, and of Savanilla Rhatany, *Krameria ixina*. It is odourless, and has an astringent bitter taste; when chewed it tinges the saliva red.

Preparations.—The Extract.

„ Infusion.

„ Tincture.

Pharmacology.—It is a powerful astringent, this property being due to the presence of Tannic Acid, of which it contains a large percentage.

Dental Therapeutics.—*As an Astringent.*—It is most efficacious in ulcerated and spongy gums. The prescription the author generally uses is—

Tincture of Krameria	.	.	2 ounces.
Eau de Cologne	.	.	1 ounce.
Glycerine	.	.	2 ounces.
Rose Water	.	.	to 12 „

To be used as a mouth-wash.

For inflamed and relaxed conditions of the fauces, Rhatany and Cocaine pastilles are most useful. They contain 2 grs. of the Extract and $\frac{1}{10}$ gr. of Hydrochlorate of Cocaine; four to six should be taken during the day.

The powder is employed as an ingredient of dentifrices, one drachm to two ounces of Creta Præcipitata being used, but it is in no way superior to Tannic Acid. As a mouth-wash, 1 drachm of the Extractum Krameriae Fluidum (Valoid—not official) to seven of Water is very useful where the gums are spongy and bleed easily.

Doses.—

Of the Extract	.	.	5 to 20 grains.
„ Infusion	.	.	1 „ 2 ounces.
„ Tincture	.	.	$\frac{1}{2}$ „ 2 drachms.

MASTICHE

MASTICH

Natural Order.—Anacardiaceæ.

Source and Description.—It is a concrete resinous exudation which flows from the stem of the *Pistacia lentiscus*, and is seen in the form of small yellowish tears which are transparent and brittle, becoming

ductile when chewed. It is insoluble in Water ; soluble in Ether and Chloroform.

Dental Uses.—Dissolved in either of the two last-mentioned drugs, it is used as a temporary filling, for the retention of dressings, by saturating a piece of cotton wool with the solution, and placing it in a carious cavity which has been previously dried and treated. The Ether or Chloroform soon evaporates, and leaves a hard mass.

The best way to make the solution is to put 2 ounces of Mastich into a wide-mouthed bottle and add 1 ounce of Ether ; leave for a few days, and then decant into a fresh bottle. This will give a nice clear solution, as the gum-resin contains many impurities, and these settle at the bottom of the first bottle. Ether is preferable to Chloroform, as it evaporates quicker. It must be kept in a well-stoppered bottle, but no matter what care is taken, evaporation of the solvent is sure to take place, and render the mixture unfit for use. This can be remedied by the addition of a little more Ether or Chloroform occasionally.

The use of temporary Gutta Percha has, to a great extent, taken the place of gum-resins as temporary stoppings. It is certainly more reliable and cleanly.

MATICÆ FOLIA

MATICO LEAVES

Natural Order.—Piperaceæ.

Description.—The dried leaves of *Piper angustifolium*. They are from 2 to 8 inches long and 1 inch

in breadth, tessellated, and of a bright yellow colour on the upper surface; reticulated, downy, and lighter in colour on the under.

Pharmacology.—It is a local hæmostatic, its power as such being due to the mechanical structure of the leaf, which, when applied, should have the under side placed next to the bleeding surface. Its styptic properties are more mechanical than chemical.

Dental Therapeutics.—*As a Local Hæmostatic.*—The leaf must be softened in hot water, and cut into strips as wide as the alveolus is deep, rolled up like cigars, the rough or under surface outwards, and placed in the alveolus or alveoli with plugging forceps, all the clots having been previously removed. Pledgets of cotton wool or lint should be placed on the top of this, and the patient told to bite firmly. The same directions should be given to the patient as when using Perchloride of Iron (see Ferri Perchlor.). Mr Charles Tomes advocates its use, but says its success depends on the care with which it is applied, and that it not only acts as a plug, but as an astringent. On the other hand, Mr Christopher Heath's opinion is that it is a *mechanical* rather than a *chemical* agent.

MENTHOL

MENTHOL

Natural Order.—Labiatae.

Formula.— $C_{10}H_{20}O$.

Synonyms.—Japanese Camphor, Peppermint Camphor.

Source.—A stearoptene obtained by cooling the oil distilled from the fresh herb of *Mentha arvensis* and of *Mentha piperita*.

Characters.—Colourless acicular crystals resembling Sulphate of Magnesium, with the odour of peppermint; or fused crystalline masses. Sparingly soluble in Water, freely so in Spirit.

Pharmacology.—It is a local anæsthetic, antiseptic, and anodyne.

Dental Therapeutics.—*As a Local Anæsthetic and Anodyne.*—By introducing a drop or two of a solution of Menthol 2 grains, Oil of Cloves 10 drops, on a piece of cotton wool, into a carious cavity it will relieve toothache. For obtunding sensitive dentine, apply a few crystals, and allow them to remain a few minutes. It is often used in a devitalising paste for its anæsthetic properties.

For neuralgia and migraine the cones of Menthol should be rubbed gently over the seat of pain, or a Menthol plaster can be applied over the painful part.

As an Antiseptic.—It is used in the treatment of dead teeth, but its value for this purpose is inferior to many other drugs.

Dose.— $\frac{1}{2}$ to 2 grains.

MORPHINA

MORPHINE

Natural Order.—Papaveraceæ.

Formula.— $C_{17}H_{19}NO_3$.

Synonym.—Morphia.

Description and Source.—It is an alkaloid of Opium, the proportion varying from 5 to 12 parts of Morphine to every 100 parts of Opium. White colourless needles, with an alkaline reaction; soluble in Alcohol, very slightly so in Ether and Water.

The *Salts of Morphine* are—the Acetate, Hydrochlorate, and Sulphate.

1. **Morphinæ Acetas.**—*Acetate of Morphine.*

Formula.— $C_{17}H_{19}NO_3, HC_2H_3O_2, 3H_2O$.

Source.—Made by precipitating Morphine from a watery solution of the Hydrochlorate by means of Ammonia, dissolving in Acetic Acid and Water, and evaporating.

Characters.—A white powder, soluble in Water and Spirit.

Preparations.—The Hypodermic Injection, and the Solution.

2. **Morphinæ Hydrochloras.**—*Hydrochlorate of Morphine.*

Formula.— $C_{17}H_{19}NO_3, HCl, 3H_2O$.

Source.—Made by macerating Opium in Distilled Water, evaporating to a small quantity, 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 colouring matter, filtered, precipitated by Ammonia, dissolved in Hydrochloric Acid, and crystallised out.

Characters.—White acicular crystals of silky lustre. Soluble in 1 in 24 of Water ; readily so in Spirit.

Preparations.—The Solution, the Lozenge, and others.

3. **Morphinæ Sulphas.**—*Sulphate of Morphine.*

Formula.— $(C_{17}H_{19}NO_3)_2, H_2SO_4, 5H_2O$.

Source.—Made like the Hydrochlorate, Sulphuric Acid being used to dissolve the pure Morphine instead of Hydrochloric Acid.

Characters.—Colourless silky crystals, soluble in 1 in 24 of Water ; sparingly so in Spirit.

Preparation.—The Solution.

THE ALKALOID AND ITS SALTS

Pharmacology.—These are anodyne, hypnotic, sedative, and antispasmodic in their action.

General Therapeutics.—They are given for the relief of pain from any cause, to induce sleep, and to subdue irritation in various organs. In such cases Morphine is best administered in the form of the Hypodermic Injection which is made from the Acetate, as this salt is more soluble than the others. It should be remembered that its use frequently leads to the "Morphine habit," which, once formed, is difficult to overcome.

They are also given as sedatives to the stomach in painful gastralgia, and spasmodic cough may be relieved by the Morphine Lozenges.

Dental Therapeutics.—*As an Anodyne.*—They are used in devitalising preparations, to modify the irri-

tant action and prevent the intense pain which follows the application of Arsenic to a pulp. For this purpose the Acetate or Hydrochlorate is preferable to the Sulphate, as the latter has some irritant properties.

Combined with Carbolic Acid, Oil of Cloves, or Creasote, it will often relieve odontalgia when applied to carious cavities:

Acetate of Morphine	. 20 grains.
Creasote	. 2 drachms.

This same preparation is also used for obtunding sensitive dentine.

For the relief of severe cases of neuralgia, Morphine may be given internally in doses of 10 to 15 minims of the *Liquor Morphinae Hydrochloratis*, or by means of the hypodermic injection. When used in the latter form it not only affords temporary relief, but at times it may bring about a cure if employed regularly every day. The injections need not of necessity be made over the seat of pain, on account of the disfigurement that might ensue.

Doses.—

Acetate of Morphine	. $\frac{1}{8}$ — $\frac{1}{2}$ grain.
Hypodermic Injection of Morphine	1—3 minims.
Hydrochlorate of Morphine	. $\frac{1}{8}$ — $\frac{1}{2}$ grain.
Sulphate of Morphine	. $\frac{1}{8}$ — $\frac{1}{2}$ „

Antidotes.—Same as Opium.

Apomorphinae Hydrochloras.—*Hydrochlorate of Apomorphine.*

Formula.— $C_{17}H_{17}NO_2, HCl$.

Source.—It is obtained by heating Morphine or Codeine in sealed tubes with Hydrochloric Acid.

Characters.—Small greyish-white, shining needles, turning green on exposure to light and air. Soluble in Water and Spirit.

Preparation.—The Hypodermic Injection of Apomorphine.

Pharmacology.—When used hypodermically, in doses of $\frac{1}{10}$ gr., *i. e.* 5 minims of the Injection, it causes rapid emesis. If given by the mouth it acts as an expectorant. It is not in any way allied to Morphine.

Therapeutics.—Its great value is as an emetic in cases of poisoning, as it is quick and certain in its action, and causes no unpleasant after-effects. When given internally as an expectorant it does not cause vomiting.

The following points, taken from Dr Murrell's work on Pharmacology and Therapeutics, are worth noting :

1. That although made from Morphine it has no narcotic properties.

2. Given hypodermically it is a powerful emetic.

3. Given by the mouth it is the best of all expectorants.

4. The Pharmacopœia solution is absurdly named, as the "Injectio Apomorphinæ Hypodermica" is more frequently administered by the mouth than subcutaneously.

5. It is not necessary that the solution should be freshly prepared.

6. A few drops of Dilute Hydrochloric Acid will prevent the solution from turning green.

7. It can be prepared from either Morphine or Codeine.

8. There are two doses for Apomorphine, the expectorant dose and the emetic dose, just as there are two doses of Carbonate of Ammonium.

Doses. — $\frac{1}{25}$ to $\frac{1}{10}$ gr. hypodermically.

$\frac{1}{10}$ „ $\frac{1}{6}$ gr. by the mouth.

MYRRHA

MYRRH

Natural Order.—Amyridaceæ.

Description.—A gum-resinous exudation from the stem of *Balsamodendron myrrha*, obtained in the form of irregular-shaped tears or masses, which vary in size, and are of a reddish-yellow or reddish-brown colour. It has a fragrant odour and a bitter, aromatic taste. The powder is of a light yellow colour.

Preparation.—The Tincture.

Pharmacology.—It is an astringent, stimulant, and mild disinfectant.

General Therapeutics.—Given in conjunction with Iron and Aloes for uterine affections, and sometimes as an expectorant in chronic bronchitis.

Dental Therapeutics.—*As an astringent and local stimulant.*—The powder is used as an ingredient of dentifrices, in the proportion 1 to 2 drachms to 2 ounces of Precipitated Chalk. The Tincture is most useful as a mouth-wash, in all kinds of ulceration and inflammation of the mouth and gums, combined with Borax.

The following prescription is very serviceable for spongy gums, both before and after the extraction of loose teeth :

Borax	4 drachms.
Tincture of Myrrh	4 „
Rose Water	to 10 ounces.

To be used as a mouth-wash.

Doses.—10 to 30 grs. Of the Tincture, $\frac{1}{2}$ to 1 drachm.

NUX VOMICA

NUX VOMICA

Natural Order.—Loganiaceæ.

Description.—The seeds of *Strychnos Nux vomica*, which are rounded, an inch or more in diameter, about $\frac{1}{4}$ inch thick ; flattish or concavo-convex ; no odour ; bitter taste. They contain two alkaloids, Strychnine and Brucine.

Preparations.—The Extract and Tincture. The alkaloid Strychnine is also obtained from the seeds.

Pharmacology.—The action of Nux Vomica is chiefly due to the Strychnine it contains. The latter drug is antiseptic, and Brucine is anæsthetic, but both are too poisonous for these purposes, as they are tetanisers of the spinal cord. It is a bitter stomachic, nervine tonic, and spinal stimulant.

General Therapeutics.—It is given in various forms of paralysis as a nervine tonic, also in neuralgia.

It is one of the best antidotes for poisoning from Chloral, but all the other methods of recovery must be persevered with.

Dental Therapeutics.—*As a Tonic.*—The tincture in doses of 10 to 15 minims is useful in neuralgia of an hysterical nature ; great care, however, should always be taken when ordering it, as small doses have been known to give rise to serious symptoms.

Doses.—

Of the Tincture	.	5 to 20 minims.
„ „ Extract	.	$\frac{1}{4}$ to 1 grain.
Strychnine	.	$\frac{1}{30}$ grain.

The Solution of the Hydro-
chlorate of Strychnine 5 to 10 minims.

Symptoms of Poisoning.—Twitching of the muscles of the limbs, a constricted feeling in the chest, dysphagia, violent convulsions, and rapid death by exhaustion and asphyxia. The diagnosis of Strychnine poisoning from idiopathic tetanus is that in the former there is complete relaxation of the muscles between the convulsive seizures, the rapidity of their course, and the comparative absence of trismus (lockjaw). In traumatic tetanus, trismus comes first and life may be prolonged for several days, whilst in Strychnine poisoning, the patient either dies, or is out of danger in a short time. There are, however, many other diagnostic signs, for which the reader is referred to works on Pharmacology, &c.

Antidotes.—Emetics, administration of Chloroform, Animal Charcoal *ad lib.*, Chloral Hydrate in $\frac{1}{2}$ drachm doses combined with the Bromides in large doses, inhalation of Nitrite of Amyl.

It is not wise to use the stomach-pump, as the passing of the tube might cause tetanic spasms.

OLEUM CAJUPUTI

OIL OF CAJUPUT

Natural Order.—Myrtaceæ.

Description.—The oil distilled from the leaves of the *Melaleuca minor*. It is transparent, limpid, and of a bluish-green colour, with a camphoraceous odour and taste. Sp. gr. .914.

Pharmacology.—Externally, it is a stimulant, counter-irritant, and anodyne; internally, an antispasmodic, carminative, and diaphoretic.

General Therapeutics.—It is given in neuralgic affections, hysteria, flatulent colic, &c.

Dental Therapeutics.—*As an Anodyne.*—A drop or two on cotton wool will relieve toothache if placed in a carious cavity. For neuralgia it may be employed both externally and internally, but its use is contra-indicated if there is any inflammatory action present, as it would tend to increase it. Combined with Morphine in the following proportions—

Acetate of Morphine	.	.	5 grains,
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Oil of Cajuput	.	.	1 drachm,
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and applied on cotton wool to painful gums after extraction, the pain is greatly lessened.

It is a solvent of Gutta Percha.

Dose.—1 to 5 drops.

OLEUM CARYOPHYLLI

OIL OF CLOVES

Natural Order.—Myrtaceæ.

Description.—A volatile oil distilled from Cloves. It is a clear and almost colourless fluid when fresh, but becomes yellowish by exposure, and ultimately reddish-brown. It contains Tannic Acid, a pungent volatile oil, resin and woody fibre, and two substances, Caryophyllin and Eugenol, the latter being called an acid, as it contains acid properties.

Pharmacology.—It is an antiseptic, obtundent of sensitive dentine, aromatic and carminative, and counter-irritant.

General Therapeutics.—Employed in atonic dyspepsia, for allaying the vomiting of pregnancy, and to relieve flatulence.

Dental Therapeutics.—*As an Antiseptic.*—It is used by some dentists as a dressing in the treatment of dead teeth, by passing strands of cotton wool soaked in the Oil, into the canals, but its chief use is for the following :

As an Obtundent.—It relieves toothache if a drop or two on cotton wool be introduced into a carious cavity. At first severe pain is felt, but this gradually subsides and the patient gets relief, which, however, as a rule, is only temporary. When applied to an irritable pulp it obtunds the pain by an over-stimulating effect.

It allays the pain of sensitive dentine, either when

used alone or combined with Tannic Acid. If used for this purpose, it is best to well swab the cavity out with the Oil, allow it to remain for five minutes, then dry with the hot-air syringe, fill with temporary Gutta Percha, and leave it for a few days.

It is also used as an ingredient of dentifrices, both as an aromatic and antiseptic, in the proportion of 3 or 4 drops to 2 ounces of Precipitated Chalk and other drugs.

Other Dental Uses.—In Microscopy it has been used as a clearing agent, but sections so treated have a special tendency to lose colour after mounting.

Dose.—1 to 5 minims.

Eugenol.—Is the active principle of Oil of Cloves. It generally relieves the pain of an exposed or partially exposed pulp, and is recommended as a root dressing after the removal of a recently devitalised pulp.

OLEUM CINNAMOMI

OIL OF CINNAMON

Natural Order.—Lauraceæ.

Source and Description.—It is distilled from Cinnamon, and is of a yellow colour when fresh, afterwards red.

Pharmacology.—It is a carminative, astringent, flavouring agent, and antiseptic. As regards its latter property, Dr Miller considers it superior to all other essential oils in its action on the pulp.

Dental Therapeutics.—*As an Antiseptic and Astringent.*—It is employed in the treatment of dead teeth, and as an ingredient of dentifrices. Powdered Cinnamon is also used for its astringent properties.

It relieves odontalgia if some be placed in a cavity with cotton wool. This effect may be due to its antiseptic powers.

It is one of the drugs which are said to disguise the odour of Iodoform.

OLEUM EUCALYPTI

OIL OF EUCALYPTUS

Natural Order.—Myrtaceæ.

Description.—An oil distilled from the fresh leaves of the *Eucalyptus globulus*, *E. amygdalina*, and other species. It is colourless when fresh, but becomes darker and thicker by exposure. Odour aromatic; flavour spicy and pungent. Soluble in Alcohol. Sp. gr. 0.900.

Pharmacology.—It is an antiseptic, disinfectant, antipyretic, antiperiodic, sialogogue, and slight astringent, this latter property being due to the presence of Tannic Acid. It possesses none of the irritating properties of Carbolic Acid or Creasote, and is not a caustic. It is certainly highly destructive to all low forms of animal life. It is a solvent of Gutta Percha and Iodoform.

General Therapeutics.—It is given in ague, typhoid fever, septicæmia, and pneumonia.

Dental Therapeutics.—*As an Antiseptic.*—It is used

for this purpose in the treatment of dead teeth, either alone or with Iodoform or Iodol, the latter for preference on account of the disagreeable odour of the former. In either case the drug or drugs can be introduced into the canals by means of a fine brooch around which is wrapped some cotton wool, and the cavity sealed with Gutta Percha. In using Gutta Percha as a temporary filling, it should be borne in mind that Eucalyptus Oil is a solvent for it. The rubber dam should be first applied, and all means taken to prevent the presence of moisture.

As a root dressing in combination with Gutta Percha, its use is questionable on account of its solvent action. It is much better to render the canals aseptic with some other drug, such as Perchloride of Mercury, and fill with Chloro-percha.

It is often included in dentifrices in the proportion of 5 to 10 drops to two ounces of Precipitated Chalk, with other ingredients.

As an Astringent.—The Tincture (unofficial) can be used for ulcerated and spongy gums.

Doses.—

Of the Oil	.	.	1 to 4 minims.
„ Tincture	.	.	$\frac{1}{2}$ to 2 drachms.

It is one of the ingredients of “Euthymol” and “Listerine.”

EUTHYMOL (not official)

Description.—It is a liquid of a pale green colour, with an agreeable odour, and is composed of a mixture of Eucalyptus, Gaultheria, Wild Indigo, Boric Acid, Menthol, and Thymol.

Pharmacology.—It is an antiseptic, germicide, and deodorant.

Dental Therapeutics.—This preparation is a soothing, antiseptic mouth-wash for those cases where the oral cavity has been allowed to get into an unhealthy state from neglect. One to two teaspoonfuls in half a tumbler of warm water can be used two or three times a day, after the teeth have been properly scaled.

OLEUM MORRHUÆ

COD-LIVER OIL

Class.—Pisces. Order, Teleostei.

Description.—The oil obtained from the livers of the cod (*Gadus morrhua*) and other fish, such as the ling, pollack, and whiting, which is of a pale yellow colour; odour and taste fishy. It is obtained from Norway and Newfoundland.

Pharmacology.—It is a nervine tonic and hæmatinic, and acts as a food, but its action in each respect is undetermined. It builds up the tissues, repairs waste, and supplies nervous, muscular, and digestive power.

General Therapeutics.—It is extensively used in all kinds of chronic disease attended by wasting, such as scrofula, chronic phthisis, rickets, and hereditary and tertiary syphilis.

Dental Therapeutics.—*As a Nervine Tonic.*—It is of great value in neuralgia occurring in weak and debilitated people. It should always be prescribed for children when, from the condition of the teeth,

ends of the bones, glands, &c., the patient is seen to be suffering from rickets. In such cases it can be combined with the Syrup of the Phosphate of Iron, in drachm doses of each, the Cod-liver Oil being gradually increased to 4 drachms, according to the assimilative power of the drug.

Dose.—1 to 4 drachms. It should always be given *after* meals. If it be persistently rejected, it should be stopped for a time, or given with Ether (10 minims of pure Ether to 1 drachm of Oil), or as an emulsion.

OLEUM TEREBINTHINÆ

OIL OF TURPENTINE

Natural Order.—Coniferae.

Synonyms.—Spirits of Turpentine, “Turps.”

Source and Description.—It is an oleo-resin obtained from the various species of pine, and is a colourless limpid liquid, with a strong penetrating peculiar odour and a bitter pungent taste; slightly soluble in Water; soluble in Ether, and in 1 in 10 of Rectified Spirit. Sp. gr. 0·864.

Pharmacology.—It is an antiseptic, disinfectant, counter-irritant, vesicant, anthelmintic, hæmostatic, and antidote to Phosphorus.

Dental Therapeutics.—*As an Antiseptic* it has been used in the treatment of dead teeth, but the author has never used it for this purpose. Sanitas Oil, which is obtained from Oil of Turpentine by oxidation, has also been advocated for the same purpose.

As a Counter-irritant it is used in the form of a

liniment for the relief of neuralgia, and the following is a useful formula :

Turpentine liniment . . .	1 ounce.
Solution of Ammonia . . .	1 „
Oil of Cajuput . . .	$\frac{1}{2}$ „
Oil of Lemons . . .	1 drachm.
Olive Oil . . .	to 4 ounces.

(Murrell.)

As a Hæmostatic it may be given internally in doses of 1 drachm at first, and followed every two hours by doses of 20 to 30 minims, in severe cases of alveolar hæmorrhage.

Doses.—10 to 30 minims. As an anthelmintic 2 to 4 drachms may be given.

Antidotes.—Stomach-pump, or emetics, and demulcent drinks. Should there be much pain, a hypodermic injection of Morphine can be given.

OPIUM

OPIUM

Natural Order.—Papaveraceæ.

Description.—The juice obtained by incision from the *unripe* capsules of the *Papaver somniferum*, the White Poppy, inspissated by spontaneous evaporation. Seen as rounded irregular masses, weighing from 8 ounces to 2 pounds, and enveloped in the remains of poppy leaves ; has a strong narcotic odour and a bitter taste. It contains many alkaloids, such as Morphine, Codeine, and Thebaine.

Preparations.—These are numerous. Twenty of them are official, about six unofficial. Two of the former are sometimes used by Dentists, viz. the Tincture and the Wine.

Pharmacology.—It is an anodyne, astringent, antisialogogue, hypnotic, narcotic, and in the form of Dover's powder, a diaphoretic and antispasmodic. Its action depends chiefly on the Morphine it contains. It excites and stimulates the circulation at first, and causes an exhilaration of the mental faculties, which is succeeded by depression and sleep. It has a paralysing effect on the bowels, and is a powerful depressant upon the respiratory functions.

General Therapeutics.—It is employed to induce sleep, relieve pain, and calm excitement. It is given in cases of neuralgia, rheumatism, sciatica, the passing of renal and biliary calculi, and other painful conditions. In ptyalism it is given to correct the excessive discharge.

Certain influences modify the action and uses of Opium. These are—

(1) *Idiosyncrasy*, which renders some patients unduly susceptible to the action of the drug, whilst others resist it.

(2) *Habit*.—The Opium habit is not at all uncommon. Patients who once contract this not only have great difficulty in getting out of it, but to obtain the ordinary effects of the drug, gradually increasing doses must be taken, till at last the individual can take what would be a poisonous dose without any ill effects.

(3) *Age*.—Children bear it badly. “Teething pow-

ders" generally contain Opium, and in consequence should be avoided.

(4) *Disease*.—Its use is contra-indicated in diseases of the respiratory organs, the heart, and the kidneys, in congestion and hyperæmia of the brain, and in alcoholic intoxication.

Dental Therapeutics.—*As an Anodyne*.—A piece of Opium or cotton wool saturated in the Tincture placed in a carious cavity will at times relieve odontalgia, should no other remedies be at hand.

The Wine of Opium (*Vinum Opii*) forms a soothing application to inflamed and tender gums and the mucous membrane of the mouth, in the following proportions:

Vinum Opii	.	.	.	.	1 ounce.
Water	.	.	.	.	to 12 ounces.

To be used as a mouth-wash.

Doses.—

Of Opium	.	.	.	.	$\frac{1}{2}$ to 3 grs.
Of the Tincture	.	.	.	.	5 „ 40 min.
Of the Wine	.	.	.	.	10 „ 40 min.

Symptoms of Poisoning.—Deep sleep, stertorous breathing, contracted pupils, feeble pulse, convulsions, coma, and death.

Antidotes.—Stomach-pump, keep the patient walking about if possible, cold affusion, irritation of the skin, strong coffee, stimulants (not alcoholic), galvanic shocks, the hypodermic injection of Ether, or Atropine. ($\frac{1}{10}$ gr.). Artificial respiration. It is much better to empty the stomach with the stomach-pump than with emetics, as the vomiting centre is generally too weak from the action of the Opium to act effectively.

PAPAVERIS CAPSULÆ

POPPY CAPSULES

Natural Order.—Papaveraceæ.

Description. — The *nearly ripe* dried capsules of *Papaver somniferum*, the White Poppy, which are globular in shape, from 2 to 3 inches in diameter, and of a light brown colour. Inodorous and slightly bitter.

Pharmacology.—They are sedative and anodyne in their action like that of Opium, but much weaker.

Dental Therapeutics.—*As an Anodyne.*—The capsules are used as a fomentation for the relief of pain after tooth extraction, or where a root has been badly fractured and left in, or where the alveolus has been fractured and the gum lacerated. In such cases direct the patient to obtain six poppy capsules, break them up, add one quart of water, and boil down to a pint. This should be used frequently *in the mouth* as hot as possible, the patient being told at the same time not to swallow any. Some warm antiseptic mouth-wash such as “Listerine” or “Euthymol,” should be used alternately with the fomentation. In the cases just mentioned, the pain not only of the operation, but the subsequent periostitis is very great, and the poppy capsules used in this way, if not absolutely removing the pain, will certainly afford relief.

Antidotes.—Same as Opium.

PEPSINA

PEPSIN

Order.—Ruminantia.

Source.—Made by scraping the cleansed mucous membrane of the stomach of the Pig, Sheep, or Calf, which should be fresh and healthy; drying the viscid pulp on glass at 100° F., and pulverising.

Characters.—A light, yellowish-brown powder, with a faint odour and bitter taste.

Pharmacology.—It is a great aid to digestion, and has antiseptic and deodorising powers. "Its action on ulcerated surfaces seems due to its power of separating dead tissues from living. This is seen when it is applied to an indolent ulcer. . . . The pale edges light up with the reddening fires of vitality, wavelets of granulations swell up over the surface of the lesion, and soon healthy tissue reaches out cellular arms across the chasm, and repair is rapid and complete."—*Med. Ann.*, 1895.

General Therapeutics.—It is employed in dyspepsia, gastralgia, and irritable conditions of the stomach with vomiting, such as ulcer and cancer. It is a valuable agent in the different forms of nutrient enemata.

Dental Therapeutics.—*As an Antiseptic.*—It has been used in the treatment of dead teeth and ulceration of the pulp. In the latter condition, where it is advisable to try and save the pulp, it is said to stop the offensive secretion and induce healthy action. It should

be used in the form of a paste, introduced into the cavity, and left in for three days. One or two applications may be necessary. The paste to be used is as follows:—

Hydrochloric Acid 1 drop.

Water 40 drops.

Pepsin, sufficient quantity to make a paste.

It is seldom used now for dental purposes.

Dose.—2 to 5 grs.

PYRETHRI RADIX

PELLITORY ROOT

Natural Order.—Compositæ.

Description.—The dried root of the *Anacyclus pyrethrum*, which is seen in the form of unbranched pieces 2 to 4 inches long, $\frac{1}{2}$ to $\frac{3}{4}$ inch thick. Inodorous, but has an acid taste.

Preparation.—The Tincture.

Pharmacology.—It is an irritant and sialogogue. When chewed, it causes a burning and tingling sensation in the mouth and throat, and a copious flow of saliva.

General Therapeutics.—It is used as a mouth-wash in cases of “dry” throat and mouth. In certain neuralgic affections of the face it is said to give relief on the patient chewing it.

Dental Therapeutics.—A few drops of the Tincture applied on cotton wool to an irritable pulp will at times relieve odontalgia. For relaxed conditions of

the mucous membrane of the mouth and gums the following can be used :

Tincture of Pyrethrum . . . 3 drachms.

Water to 8 ounces.

To be used as a mouth-wash.

Dose.—Of the tincture 5 to 30 minims.

QUILLAIA SAPONARIA (not official)

QUILLAIA BARK

Natural Order.—Rosaceæ.

Synonym.—Soap bark.

Description.—It is the bark of the *Quillaya Saponaria*, and is imported in flat pieces, 2 to 3 feet long and several inches wide ; is hard and tough ; contains *saponin*.

Pharmacology.—It is a detergent and errhine. When used in the oral cavity it causes a froth to form.

Dental Therapeutics.—*As a Detergent.*—It is used as an ingredient of mouth-washes for chronic ulcers of the mouth, and to check excessive secretion of the mucous membrane. For this purpose it is best used in the form of the Valoid Fluid Extract in the proportion of one teaspoonful to a pint of water.

QUININÆ SULPHAS

SULPHATE OF QUININE

Natural Order.—Cinchonaceæ.

Formula.— $(C_{20}H_{24}N_2O_2)_2, (H_2SO_4)_2, 15H_2O$.

Source.—It is an alkaloid obtained from the powder of various kinds of Cinchona and Remijia Bark.

Characters.—Snow-white feathery crystals with a bitter taste; only slightly soluble in Water; soluble in Alcohol and the Dilute Acids.

Pharmacology.—It is a tonic, stimulant, antiperiodic, antiseptic, and antipyretic. When given in large doses it causes symptoms of *Quinism*, such as buzzing in the ears, headache, deafness, vertigo (patients will complain that they feel as if their head would split), disorders of vision, coma and convulsions. Some people cannot take it, the smallest dose causing headache.

General Therapeutics.—These are far too numerous to mention in detail in a Dental work. Briefly speaking, one of its chief uses is as an antipyretic in many of the acute specific fevers, as in large doses (15 grains) it lowers the temperature. Smaller doses given at shorter intervals do not have this effect, as it is not accumulative in its action. It is said to be a preventative of influenza if taken in 2 to 3 grain doses every morning during an epidemic.

The indications for its use, in some forms of neuralgia, are:—

- (1) That the pain is supra-orbital.

(2) That it is periodic.

(3) That there is a history of malarial disease (Murrell).

It is used locally as a gargle in cases of putrid sore throat, aphthous ulceration, and scurvy. This may be combined or not with the internal administration of the drug.

Dental Therapeutics.—*As an Antiperiodic.*—It is given in cases of neuralgia in doses of 1 to 10 grains with good effect. This may be due to its tonic action, as Quinine has no direct action on the peripheral nerves. If the neuralgia be of malarial origin it will bring about immediate relief in doses of 5 grains.

As a Tonic.—It is given in cases of cancrum oris, though the author thinks preference should be given to Cinchona Bark and Carbonate of Ammonium, more particularly when Nitric Acid has been used as a local application (see page 64).

Dose.—1 to 5 grains as a tonic; 5 to 20 grains as an antipyretic and antiperiodic.

SAPO DURUS

HARD SOAP

Natural Order.—Oleaceæ.

Synonyms.—Sodium Oleate, Castile Soap.

Source.—Made with Olive Oil and Soda.

Pharmacology and Therapeutics.—It is an antacid and cleansing agent, and is used in a powdered form in dentifrices. The following forms a nice tooth-powder for those who like a saponaceous combination :

Precipitated Chalk	.	.	2 ounces.
Light Magnesia	.	.	$\frac{1}{2}$ ounce.
Powdered White Soap.	.	.	2 drachms.
Orris Root Powder	.	.	2 „
Oil of Cloves	.	.	4 drops.

SINAPIS

MUSTARD

Natural Order.—Cruciferae.

Description.—A greenish-yellow powder, made from mixing black and white mustard seeds which have been powdered. It has a penetrating, pungent odour, and is very irritating to the nostrils and eyes.

Pharmacology.—Applied externally in the form of a poultice or plaster, it is a rubefacient and counter-irritant, causing redness, heat, and severe pain, and if its application be prolonged it causes vesication. It is one of the most useful emetics we have, as it is nearly always at hand.

General and Dental Therapeutics.—In narcotic poisoning it is most valuable, as it has a rapid stimulant action, and causes very little after-depression. From one to four teaspoonfuls may be well stirred up in a tumbler of warm water for this purpose.

As a counter-irritant, it can be used in the form of a “flying” blister to the face in cases of neuralgia, which it will relieve, although the pain in the tooth will remain if that has been the cause of the neuralgia.

Mustard leaves are a very convenient substitute for the mustard poultice.

THYMOL

THYMOL

Natural Order.—Labiatae.

Formula.— $C_{10}H_{13}HO$.

Synonym.—Thymic Acid.

Source.—A stearoptene obtained from the volatile oils of *Thymus vulgaris*, *Monarda punctata*, and *Carum Ajowan*, by saponification with Caustic Soda, and treating the soap with Hydrochloric Acid. Purified by recrystallisation from Alcohol.

Characters.—Large oblique prisms, with an aromatic odour. Freely soluble in Alcohol and Ether; sparingly so in Water.

Pharmacology.—It is an antiseptic, anti-putrefactive, and disinfectant. Its action is similar to that of Carbolic Acid, but it is less irritating. It is one of the ingredients of "Listerine" and "Euthymol."

Dental Therapeutics.—*As an Antiseptic.*—It is employed for suppuration and chronic inflammation of the pulps of teeth, also in the treatment of the roots of dead teeth, and for alveolar abscesses. It is sometimes used as an ingredient of devitalising pastes on account of its local anæsthetic effect. Dr Miller recommends the following :

Thymol,

Arsenic, of each 10 grains.

Oil of Cloves, sufficient quantity to make a paste.

The only disadvantage of this mixture is that part of the Thymol separates from the Arsenic, in crystalline form, rendering it necessary to stir the paste from time to time.

Dose.— $\frac{1}{2}$ to 2 grains.

VERATRINA

VERATRINE

Natural Order.—Melanthaceæ.

Source.—An alkaloid, or mixture of alkaloids, obtained from Cevadilla; not quite pure.

Characters.—A pale grey amorphous powder; taste acrid; odourless, but irritant to the nostrils. Nearly insoluble in Spirit.

Preparation.—Unguentum Veratrinæ.

Pharmacology.—It is an antipyretic and anodyne, but is seldom given internally, on account of its powerful depressant action on the heart and respiration. When sniffed into the nostrils it causes sneezing and cough, and is therefore an errhine, but no use is made of this property. It is used locally as an anodyne, but should not be applied to raw surfaces, as it will not only excite pain and inflammation, but the powerful specific effects of the drug may be produced.

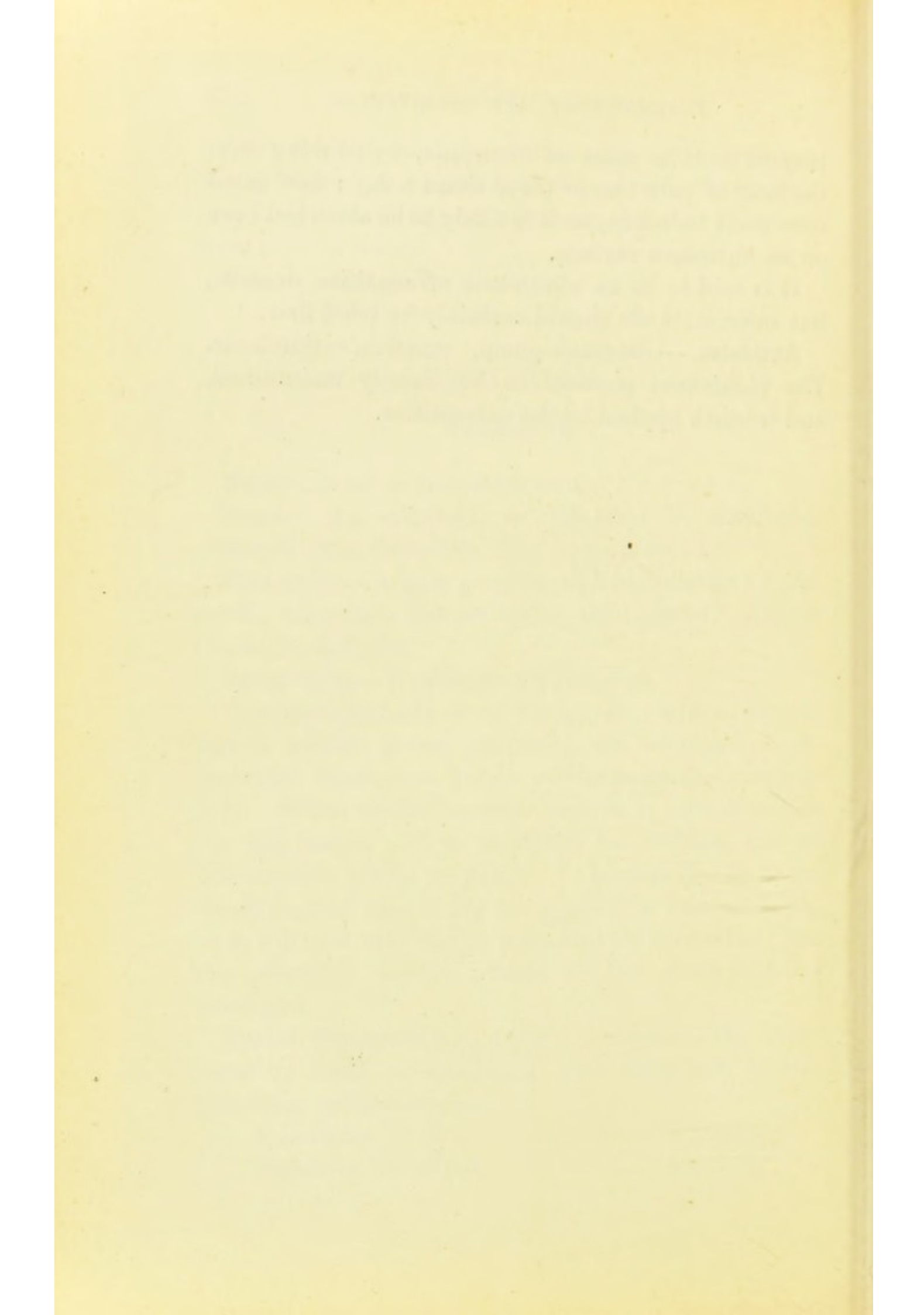
Dental Therapeutics.—*As an Anodyne.*—The ointment by itself, or combined with Aconitine in the following proportions—

Aconitine.	.	.	.	2 grains,
Veratrine Ointment	.	.	.	$\frac{1}{2}$ ounce,

may be used in cases of neuralgia, by rubbing over the seat of pain two or three times a day ; but great care must be taken, as it is likely to be absorbed even on an unbroken surface.

It is said to be an obtundent of sensitive dentine, but safer methods should certainly be tried first.

Antidotes. — Stomach-pump, emetics, stimulants. The recumbent position to be strictly maintained, and warmth applied to the extremities.



BRIEF NOTES

SHORT NOTES OF THOSE DRUGS WHICH ARE ONLY
OCCASIONALLY USED BY DENTISTS; ALSO OF
THOSE USED IN DENTAL MICROSCOPY.

ACETANILIDE. "Antifebrin."—An antipyretic and anodyne. Is given for neuralgia, and migraine. It is a depressant, so must be prescribed with caution. *Dose.*—1 to 4 grs. *Antidotes.*—Emetics and stimulants.

ACIDUM HYDROBROMICUM DILUTUM. Dilute Hydrobromic Acid.—Is given as a sedative in neuralgia, and infantile convulsions due to teething. *Dose.*—15 to 50 minims.

ACIDUM OSMICUM. Osmic Acid.—Is used in Dental Microscopy as a staining reagent for colouring the myelin sheaths of spaces in medullated nerves, and for interglobular dentine. It is also a hardening reagent.

ACIDUM OXALICUM. Oxalic Acid.—Used occasionally as a bleaching agent. The same precautions must be taken with this drug as with others when using it for this purpose, such as application of rubber dam, plugging apical foramen, &c. Other drugs are to be preferred. *Antidotes.*—Chalk, lime, or whiting, freely diluted. Emetics.

ACIDUM PICRICUM. Picric Acid.—Is a decalcifying, hardening, and staining reagent.

ACIDUM SULPHUROSUM. Sulphurous Acid.—Is a

“parasiticide,” and is sometimes used as a mouth-wash in cases of thrush and fungoid affections of the mouth, in the strength of 1 part to 10 of Water.

ACIDUM TARTARICUM. Tartaric Acid.—Used in combination with Chloride of Lime as a bleaching agent.

AGAR-AGAR. Japanese Isinglass.—Used for making jellies for invalids, and as a cultivating nidus for germs.

ASEPTOL. A Coal-tar Derivative.—A 3 per cent. solution is said to be useful in pyorrhœa alveolaris, when applied to the pouches which form between the gums and teeth, in arresting the flow of pus.

ATROPINÆ SULPHAS. Sulphate of Atropine.—Is used sometimes as an ingredient of devitalising pastes, but is not so effective as Morphine.

AURUM CHLORIDUM. Chloride of Gold.—Used in Dental Microscopy as a staining reagent.

BISMUTH.—Used in the workroom for making fusible alloys.

BISMUTHI SUBNITRAS. Subnitrate of Bismuth.—Given internally for aphthæ, mercurial salivation, and the vomiting and diarrhœa of dentition.

CAFFEINÆ SODIO-SALICYLAS.—Used hypodermically as a restorative for Alcoholic and Morphine intoxication. *Dose.*—1 to 4 grains.

CANNABIS INDICA. Indian Hemp.—May be tried in cases of neuralgia when other drugs have failed. *Doses.*—Of the Extract, $\frac{1}{4}$ to 1 grain; of the Tincture, 5 to 20 minims.

CANADA BALSAM.—Is used for mounting specimens in Dental Microscopy.

CEDAR OIL.—Is a clearing reagent.

CELLOIDIN.—Is a preparation of pure Pyroxylin, and is used as an embedding medium for dental tissues.

CERA FLAVA. Yellow Wax.—Used as a root filling, combined with various antiseptics. Also for taking impressions, but has been superseded for this purpose to a great extent by various Compositions, Plaster of Paris, and Gutta Percha.

DERMATOL.—A trade name for Subgallate of Bismuth. It is a yellow powder resembling Iodoform without its odour. It is an antiseptic and desiccative, and has been used in the treatment of dead teeth.

EXALGIN.—This drug is said to be the remedy *par excellence* in the treatment of Neuralgia, whether this disease be the result of simple nerve irritation, or due to a true neuritis. ('Medical Annual,' 1896.) It can be prescribed in the form of "tabloids" which contain 2 grains. *Dose.*—One to two tabloids. The name is registered.

FICUS. The Fig.—Useful as a poultice in alveolar abscess, especially in young children, by placing one, or a piece of one, which has been heated, between the gum and cheek.

FUCHSIN.—Is used in Dental Microscopy as a staining reagent, the red colour formed by it being fairly permanent.

GUAIACOL. A derivative of Wood Creasote.—Is an antiseptic and germicide, and is sometimes used for putrescent pulps in preference to Creasote.

HIRUDO. The Leech.—Only occasionally applied to the gum over the root of a tooth affected with acute

periodontitis, to relieve inflammation and congestion.

IRIDIS RHIZOME. Orris Root.—It is used as an ingredient of dentifrices for its violet odour. On account of its cathartic action, infants should not be allowed to rub their gums with it.

“LANOLINE.” The natural fat of Wool.—Is sometimes combined with Arsenic and Cocaine in devitalising pastes.

MEL. Honey.—This is generally used as a vehicle for other drugs, and, as regards the mouth, acts as a demulcent, relieving dryness and pain.

OLEUM AMYGDALÆ DULCIS. Oil of Sweet Almonds.—A soothing application for excoriations of the lips, and to simple but painful ulcers of the gums, cheeks, and tongue.

OLEUM GAULTHERIÆ. Oil of Gaultheria. Oil of Winter-green.—Used locally as an antiseptic, and also as a flavouring agent in tooth-powders. It is one of the ingredients of “Listerine.”

OLEUM OLIVÆ. Olive Oil.—Useful as a local application when Carbolic Acid has been dropped on the gums, lips, or face of a patient. It should also be given internally very freely when the same or the Mineral Acids have been taken.

OLEUM RICINI. Castor Oil.—Given internally as a purgative in doses of $\frac{1}{2}$ to 4 drachms. Applied to the eye, it acts as a local sedative when any foreign body has flown into it.

POTASSII BICHROMAS. Bichromate of Potassium.—Is used as a hardening reagent in Dental Microscopy.

PULVIS RHEI COMPOSITUS. Compound Powder of

Rhubarb. “Gregory’s Powder.” — Useful for the diarrhoea of infants in doses of 5 to 10 grains.

SANDARACH. A Gum-resin.—Used as a substitute for Mastich, and in the same way.

SEPIA OFFICINALIS. Common Cuttle-fish.—The powder is occasionally used as an ingredient of tooth-powders. Half a drachm to 2 ounces of Precipitated Chalk with other ingredients, is quite enough.

SODII BROMIDUM. Bromide of Sodium.—This is used for almost the same purposes as Bromide of Potassium, but is not so depressing in its action.

SODII ETHYLAS. Ethylate of Sodium.—Is an obtundent of sensitive dentine. It is also a caustic, and is used for the removal of small vascular growths in the mouth. For this purpose the Liquor Sodii Ethylatis is applied with a pointed glass rod for two or three days, when a scab will form; when this falls off, the treatment should be renewed.

SODII HYPOSULPHIS. (For uses see Iodine.)

SODII SALICYLAS. Salicylate of Sodium.—Is given internally for neuralgia, odontalgia, and exostosis of the teeth of rheumatic origin. Also in the treatment of acute tonsillitis, and if given in full doses it will nearly always prevent suppuration. *Dose.*—10 to 30 grains.

SULPHONAL.—Useful as an hypnotic in cases of neuralgia pure and simple. It is given in doses of 15 to 40 grains, either in “cachets,” hot beef-tea, or brandy and water, and, as it is absorbed very slowly, should be taken two hours before sleep is required.

TINCTURA CALENDULÆ. Marigold.—Is used as

a healing mouth-wash in the proportion of 1 drachm to 1 ounce of Water.

TINCTURA PHOSPHORI COMPOSITA. Compound Tincture of Phosphorus.—(Adopted by The British Pharmaceutical Conference.) This is most useful in certain cases of neuralgia. *Dose.*—3 to 12 drops on Sugar.

TINCTURA VALERIANÆ AMMONIATA. Ammoniated Tincture of Valerian.—Useful remedy for neuralgia in hysterical patients. *Dose.*— $\frac{1}{2}$ to 1 drachm.

GENERAL ANÆSTHESIA

FOR

DENTAL OPERATIONS

BY

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GENERAL ANÆSTHESIA

FOR

DENTAL OPERATIONS

THE following section on Anæsthetics is intended to present to the reader a concise account of the easiest and safest methods of producing general anæsthesia, suited to the requirements of a Dental Surgeon.

To induce a sleep that no pain shall disturb, be it never so brief, requires not only the soothing drug, but also an administrator who can intelligently apply that drug, and pilot the patients safely along the path where—

“Death and nature do contend about them,
Whether they live or die.”

Chloroform is at the present day used very largely in the provinces and in Scotland, but its routine employment in dental surgery is undoubtedly fraught with danger. The marked depression of the heart, and the lowered arterial tension induced by this drug, are grave complications under any circumstances, and especially so should any respiratory

embarrassment arise. Moreover, the orthodox posture of the patient for Chloroform administration is *dorsal*, whereas for dental operations the sitting position is the most convenient. Consequently Chloroform anæsthesia is not discussed.

For much the same reasons no reference is made to the less-frequently used anæsthetics, such as Methylene, Bromide of Ethyl, Ethidene Dichloride, Pental, &c.

The anæsthesia produced by the inhalation of Nitrous Oxide gas, either alone or combined, is acknowledged by the best authorities to be eminently satisfactory for dental operations. This chapter, then, will be devoted to a study of such anæsthesia, and while gladly availing myself of the writings of Buxton, Silk, Hewitt, Binz, and others, I have endeavoured to avoid controversial matters, but rather to indicate as definitely as possible, the rules that should guide the anæsthetist in dental operations, and to add such accessory information as is useful or indispensable in practice.

For the block used for Fig. 1, my best thanks are due to Dr Hewitt; for those represented by Figs. 2 and 3, I am indebted to the kindness of Dr Dudley Buxton, and for considerable assistance in passing these sheets through the press I am indebted to my friend Dr Silk.

To Mr Clarkson, of Bartlett's Buildings, I am under an obligation, for allowing me to go over his factory, and to see for myself the different steps in the preparation of Nitrous Oxide Gas.

I venture to hope that, though the scope of this

article is necessarily restricted, and the handling, I fear, far from perfect, it may nevertheless be of service not only to the Dental Surgeon, but also to the medical practitioner who has the honour of administering anæsthetics for his Dental *confrère*.

Nitrous Oxide, N_2O , is a compound, as its formula indicates, of Nitrogen and Oxygen in the proportion of two molecules of the former to one of the latter. It is sometimes spoken of as Nitrogen Protoxide, Nitrogen Monoxide, or Dephlogisticated Nitrous Gas. Until quite recent years its impurities, which caused a certain ebullition of hilarity, earned for it the title of Laughing Gas.

At ordinary temperatures and pressures it is gaseous; at -88° Centigrade, or at a pressure of 30 atmospheres, it becomes liquid; while at a temperature of -100° Centigrade it crystallises into a snowy white mass.

The gas is colourless, with a sweetish taste and smell, sparingly soluble in cold water, and is heavier than Oxygen. Fifty gallons weigh approximately 15 oz.

It supports combustion readily, a spark on the end of a match kindling into flame when plunged into it.

On being subjected to a red heat it breaks up into its constituent elements, Nitrogen and Oxygen, and a considerable amount of heat is evolved in the very act of decomposition. An exceedingly low temperature is produced when liquid Nitrous Oxide is evaporated *in vacuo*.

Preparation.—Heat pounded Ammonium Nitrate in a retort, pass the gas which bubbles over through

distilled water, and several bottles of Ferrous Sulphate solution, and Caustic Potash solution; then collect in a Gasometer. This method is convenient for preparing small quantities of gas, but when the manufacture is conducted on a larger scale the following details are of importance: (1) to keep the temperature as low as possible; (2) to subdivide thoroughly the gases that escape; (3) to ensure their saturation with the purifying medium; (4) to regulate the escape of the gases to a nicety. Nitrous Oxide of a high purity is thus obtained, and may be driven under pressure into steel or iron cylinders for storage and future use. By this manœuvre the gas is liquefied, and the space it occupies is considerably reduced.

Pharmacology.—On being inspired it passes into the pulmonary capillaries; there it dislodges the Oxygen from the Hæmoglobin, with which it forms a loose combination itself. A similar combination is made with the albumins of the blood generally. This union is quickly dissolved on the restoration of air to the blood-current.

It has been maintained by the late Sir George Johnson and other able physicians, that the phenomena observed during inhalation of the gas are entirely due to *asphyxia*; in other words, that the anæsthesia is the result of oxygen starvation, pure and simple. The experiments of Paul Bert and others tend, however, to cast doubt on this theory; indeed, at the present day most anæsthetists are agreed, that Nitrous Oxide produces anæsthesia independent of asphyxia. It is nevertheless a significant fact that *cyanosis*, and

other results of oxygen starvation are common accompaniments of the deeper stages of this anæsthesia.

On inhaling the gas the **Respirations** become at first quicker and deeper, then shallower and slower; finally, stertorous ere they cease. The amount of Carbonic Acid Gas normally exhaled is lessened during the administration of Nitrous Oxide.

The **Heart's** action is slightly increased in force and rapidity, but in deep narcosis it is slowed. It continues to beat for a variable time, after the respirations have ceased; this is dependent on the tone of the heart muscle, and on the resistance it has to overcome in the vessels. If the breathing is not resumed its beats become feebler and slower, and finally cease. The **Pulse**, besides being more rapid, is increased somewhat in hardness and volume.

Buxton has demonstrated that the **Blood-vessels** in the brain are markedly distended.

The **Central Nervous System** yields to the influence of the gas in the following order:—The cerebrum, cerebellum, spinal cord, medulla. The “*nœud vital*,” or, more strictly speaking, the respiratory centre, becomes paralysed before the cardiac centre.

With the first few inspirations the **Sensory Nerves** are rendered more impressionable. Then follows blunting of their sensibility, with impairment or paralysis of the reflexes.

The **Voluntary Muscles** exhibit irregular ataxic, clonic, or tonic contractions. The clonic contractions are referred to as *subsultus* or *jactitation*, and occur in the fingers first. When the back muscles are involved, a tonic contraction known as *opisthotonos*

is produced, in which the patient rests on the head and the heels, and the back is arched forwards. Should the respiratory muscles become fixed, *cyanosis* is quickly accentuated; the same increased cyanosis is produced by respiratory calm or paralysis, an event sometimes observed in deep narcosis.

The **Pupils** are affected early in the majority of cases. The abolition of the light reflex produces a stony, vacant, meaningless stare of the eyes, which is so frequent an accompaniment of early anæsthesia. In old people, or in those suffering from locomotor ataxy, this sign is feebly marked or absent.

The pupils are normal, or very slightly dilated; but in deep anæsthesia they become widely dilated.

The **Eyeballs**, just as the anæsthesia is being established, move, as a rule, co-ordinately upwards to one or other side, where they oscillate spasmodically within a small arc of a circle. At times divergence of the eyeballs is noticed.

The **Bladder**, and very rarely the **Rectum**, may expel their contents. This is more especially seen in boys and females.

Retching and **Vomiting** occur occasionally, just as the anæsthesia is complete; particularly is this the case after a recent meal.

Certain **Rhythmic Movements** are often observed in the earlier stages of the administration. These are so obviously associated with the patient's trade, that the title "occupation movements" may be appropriately applied. For instance, a seamstress will move her feet exactly as she would work the treadles of her sewing machine.

Soon after the inhalation is commenced the patient experiences certain **Subjective Symptoms**, *e. g.* :

Buzzing in the ears.

Fulness of the head.

Dimness of vision.

A feeling of warmth all over the body.

A lightness of the limbs, ascribed to a loss of the muscular sense.

With progressive mental obscuration, phantasy pursues phantasy in quick succession, and an exuberant hilarity fills his being. He may have a cogent desire, but inability, to speak and explain some problem, usually psychical; or he may feel himself face to face with overwhelming odds, which he must fight to the bitter end. He dreams he is on a journey, or wrestling with a mortal foe. If the patient be a woman, she may be struggling to protect herself from an attempted rape. These mental states are so vivid, and the impression on the mind so powerful, that a woman may, for instance, make a charge against a dental surgeon, the gravity of which is obvious.

On the perfectness of the sensory apparatus depends our consciousness; thus it will be seen that Nitrous Oxide, by removing one after another the sensations passing along the sensory nerves and the nerves of the special senses, abolishes perceptions of the mind, and renders the emotions, intellect, and will, inaccessible to centripetal stimulation and incapable of centrifugal motor messages; in this way does it produce a sleep that no pain disturbs.

APPARATUS

For the administration of Nitrous Oxide alone, the apparatus represented below is probably the best.

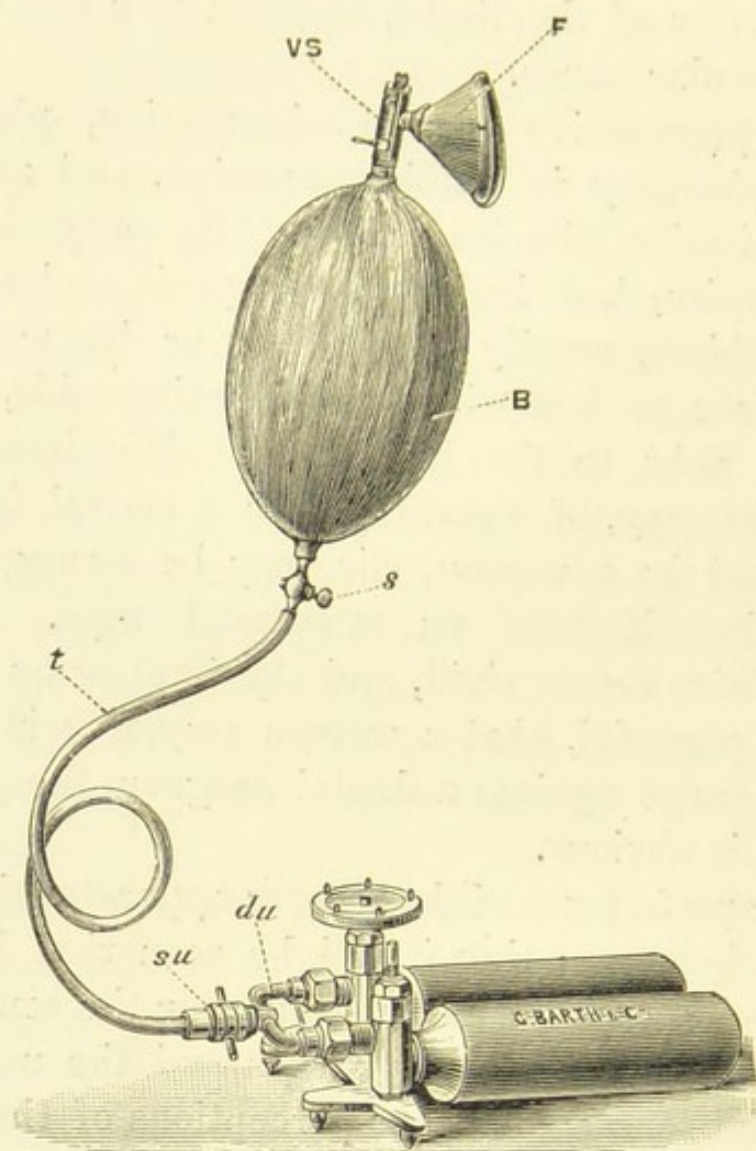


FIG. 1.

Two steel bottles charged with the gas are fixed almost horizontally in a firm metal frame. A foot-key controls the escape of gas through the metal

branch *du* and the screw junction *su* into a tube *t*. Thence it passes into a gas-bag B, which is capable of holding 2 to 3 gallons. Between the face-piece F and the bag is a valved stopcock VS. At the upper part is a tap which, when open, allows air to be expired from the face-piece. An india-rubber valve allows a current of air to pass outwards only. At the lower part of the stopcock is a handle, which in the "off" position allows air to be inspired towards the face-piece, and in the "on" position allows gas to flow from the bag in the same direction. The current of air or gas passes on its way an india-rubber valve, which opens towards the face-piece.

For the administration of Gas in combination with Ether, a very convenient apparatus is a modification of Clover's Gas and Ether Inhaler, introduced by Dr Dudley Buxton and figured below. He interposes a metal bottle (C) in the gas path, and by means of a tap transmits at will the Nitrous Oxide direct to the patient, or passes it over the Ether first.

One or two steel bottles of gas fixed and controlled as above should be connected by india-rubber tubing *h* with the metal receiver C, previously charged with 3 or 4 drachms of Ether.

By turning the foot-key *f* gently by a to-and-fro movement the current of gas may be allowed to flow along the tube *h* directly into the bag D, and so to the face-piece E; or else it may be diverted by the tap *k*, to pass over the Ether, thence along a tube *n* which occupies the long axis of the bag D, and opens directly towards the face-piece. Between the bag and the face-piece is the stopcock, with a dial-plate marked

G and E at either end. Riding over this dial-plate is a moveable bar, indicating if Air, Gas, or

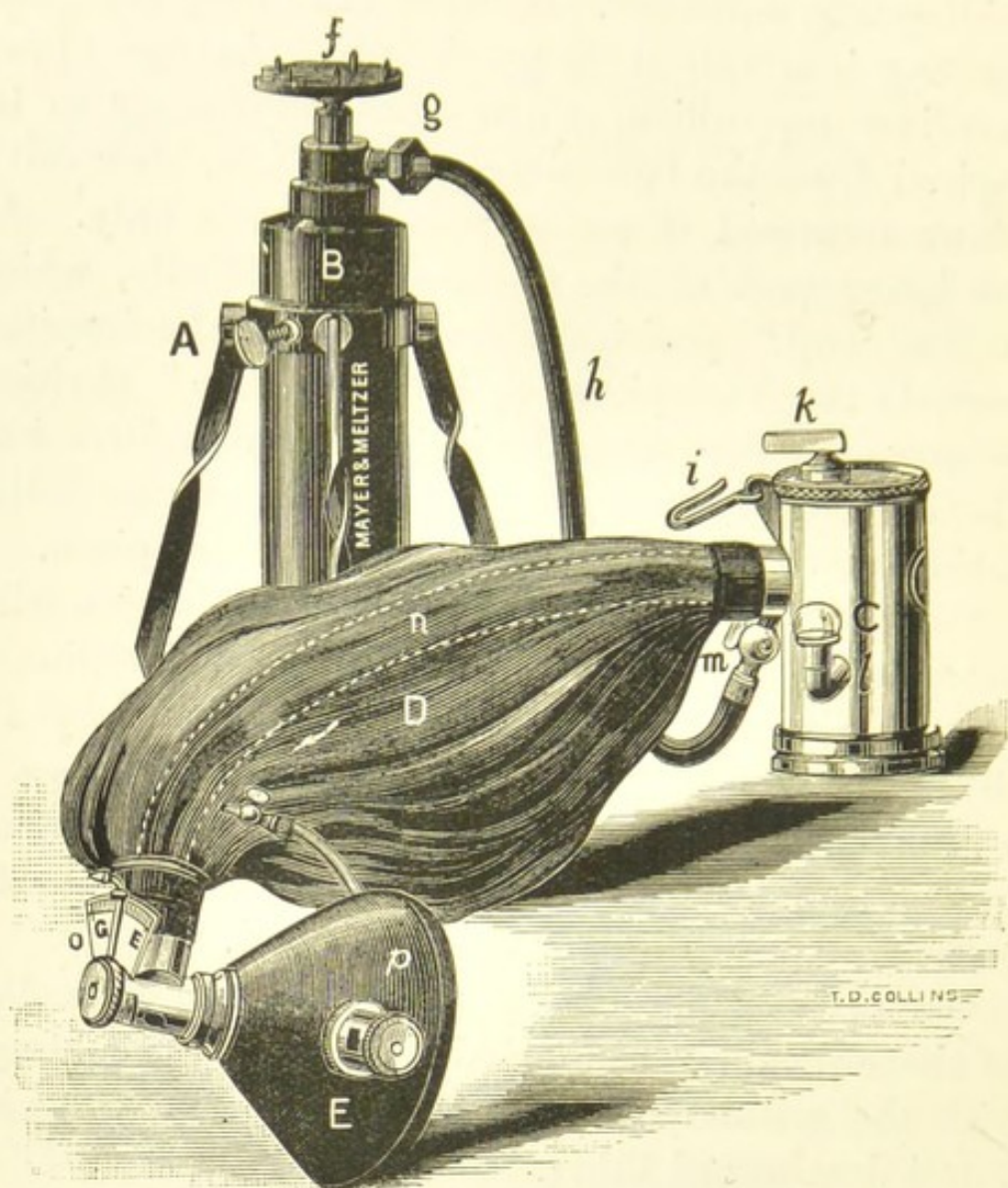


FIG 2.

Ether is inspired. When the index points towards the face-piece, air alone is inspired; when moved on to G, inspiration of gas takes place from the bag; and when moved to E, the tube *n*, communicating with the receiver C, is alone utilised, the bag D being shut off. In all these instances expiration takes

place through a valve *p* in the side of the face-piece. While the index travels from *G* to *E* the vapour becomes more and more heavily laden with the Ether, until, when it stands on *E*, the whole of the gas inspired is passed over the Ether first. Just above the spot where the india-rubber tube conveying the gas from the cylinder joins the receiver there is a small tap *m*, the utility of which is to disconnect the tube, and to admit air instead of gas in those cases where jactitation, cyanosis, or stertor occurs before sufficient Ether vapour has been administered to be of any service.

When a gasometer is employed, a large-sized mohair tube conveys the gas through a Cattlin bag to the face-piece. There are two taps, a simple one fixed to the gasometer and admitting the gas into the tube, and a three-way stopcock between the bag and the face-piece. This latter allows air alone to be inspired, or gas to be inspired with expiration occurring through a valve, or finally it allows to-and-fro breathing into the bag. Thus the Cattlin may be used as a supplemental bag towards the close of the administration. The main advantage of such a manœuvre is economy, but its drawbacks are evident.

Oxygen may be administered with Nitrous Oxide. Bert, Hillischer, and Hewitt have practised this mode of producing anæsthesia in some thousands of cases, and certain definite advantages are secured thereby. Dyspnœa, cyanosis, and jactitation are conspicuous by their absence, a good anæsthesia is obtained, and one lasting on the average about forty-five seconds. For ordinary cases about twelve gallons of gas are

requisite, and Oxygen is permitted to mix with the Nitrous Oxide in any proportion from 1 to 10 or 15 per cent. Dr Hewitt has an ingenious arrangement for increasing or diminishing the amount of Oxygen in the mixture. The condition produced seems to be a Nitrous Oxide anæsthesia combined with an Oxygen apnœa. The signs of anæsthesia, according to Dr Hewitt, are—

- (1) Absence of conjunctival reflex.
- (2) Tranquil or softly snoring breathing.
- (3) Flaccidity of the arms.
- (4) Fixation or slight oscillation of the eyeballs.

ADMINISTRATION

The best time of the day for the anæsthetic is 11 a.m., *i. e.* two or three hours after breakfast, though gas may be administered any time of the day or night, and be productive of no ill effects. No stimulant is as a rule necessary,—in fact, it is frequently the cause of undue excitement while the patient is passing under the influence of the gas, or else while he is recovering consciousness. Some advocate a preliminary injection of Atropine (gr. $\frac{1}{200}$) hypodermically in patients suffering from an enfeebled heart muscle.

It is desirable that the bladder and rectum be emptied beforehand.

The operating room should be light, and the chair, fixed near the window, should be one which can at a moment's notice alter the patient's position from a sitting to a recumbent one. The necessary dental

instruments, &c., should be concealed from sight by a napkin.

The gas apparatus must be in perfect working order, and the bag half filled with gas. Within easy reach there should be a Buxton's gag (see Fig. 3), a basin, a tumbler of warm water, and a sponge. Also some Nitrite of Amyl capsules, tongue forceps, a tracheotomy case with both laryngeal and tracheal tubes, brandy, ether, and a hypodermic needle should be at hand. Useful additions even to this repertoire are a Galvanic Battery and Strychnine tabloids suitable for hypodermic injection.

Either a nurse, or a friend of the patient, should be present during the operation.

The patient's *Dress* should be so arranged that the fullest inspiration is unencumbered, the neck and waist being absolutely unfettered by constricting bands. Foreign bodies *must* be removed from the mouth, *e. g.* a denture, a plug of tobacco, &c. At this juncture the dentist should examine the mouth, deciding finally what instruments to use and how to apply them, what teeth to extract and in what order.

Where there is a beard or side whiskers care must be exercised that the face-piece be accurately applied, and that no admixture of air allowed to take place. To attain this object it is recommended by some that the parts be well soaped first.

As regards the best all-round position, sitting with the head inclined slightly backwards seems the most convenient. Although the heart has more work to do, when the patient sits bolt upright, yet, on the other

hand, the semi-recumbent posture is dangerous on account of the ease with which foreign bodies fall back into the larynx.

For most dental operations it is a desideratum to keep the patient's mouth open while he is asleep. To secure this object a prop is introduced between the teeth prior to the administration of the anæsthetic. This prop should be firmly tied with whipcord or fishing gut to other props hanging outside the mouth. It should not be too large and cause difficulty in breathing, or undue stretching of the Masseter muscles; it should not cause pain locally on the teeth or gum, and it should be placed by the *operator* himself in the position of least interference with his intended movements.

Occasionally a temporary gag is placed between the teeth, *e. g.* when the mouth cannot be opened sufficiently wide, or when the operation is extensive, or

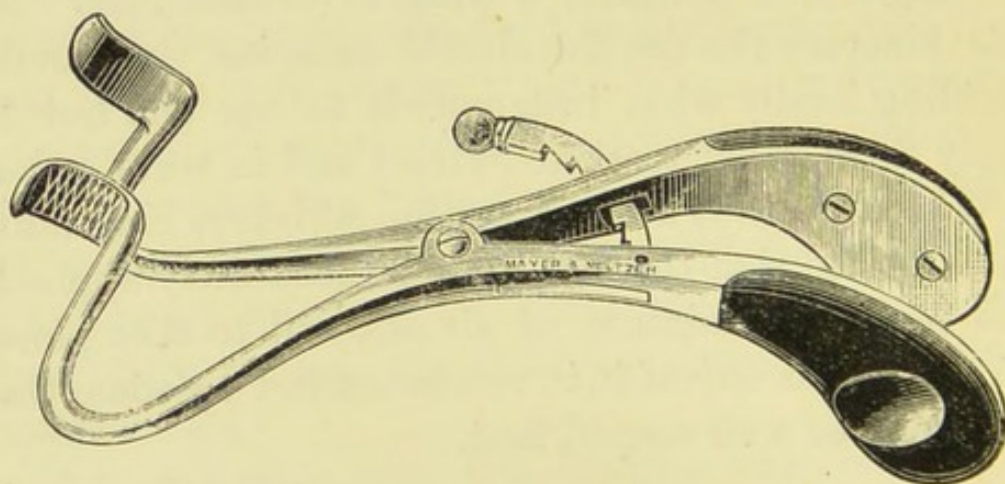


FIG. 3.

when there are no convenient teeth against which to rest the gag in the usual way. In these cases, when the acme of anæsthesia is reached the prop should

be removed, while Buxton's gag figured above should be inserted on the side of the mouth opposite to the seat of operation. This instrument should be applied between opposing bicuspid or molars, and caution should be used not to open the blades too widely, nor to place them between loose teeth.

Prior to the inhalation it is of the first importance to **gain the confidence** of the patient. A few remarks, cheery and diverting, clear away a host of vague fears. After asking the patient to sit in the chair and rest the head back quite comfortably, his fingers should be clasped in one another and his feet allowed to rest on the floor at each side of the chair, or else to dangle in that direction. The dress should be protected up to the chin with a macintosh, and the hair of the head covered with a napkin. Then the prop is introduced, with a word of explanation if discretion suggests it, and the face-piece gently applied. The cushion of the latter should be but half inflated, and not pressed too firmly at first against the patient's face. It is hardly necessary to add that the nose, as well as the mouth, should be covered by the face-piece. Then, if the patient be a child, some story likely to amuse him may be quietly told; this, while keeping the mind occupied, will lessen the subjective feeling of suffocation experienced by some, and facilitate the administration greatly.

If the patient be a nervous woman, it may be well to show her first how the face-piece is applied, and then ask her to put it on herself. By a gentle movement, unnoticed by the patient, the tap may be moved so that gas flows from the half-filled bag. She

may then be told that if she breathes deeply and well she shall have some gas, and then she will go to sleep for a while, and waken up without having any pain at all. In cases such as these I usually keep the bag slightly surcharged with gas, thus not only avoiding leakage of air through the face-piece but also utilising the elastic nature of the bag to produce a positive pressure towards the lungs with each inspiration. By this means one hastens the acme of anæsthesia.

Absolute silence during the administration and during recovery is of the greatest importance, as the power of hearing is in some cases rendered painfully acute.

The quantity of gas necessary to produce an average anæsthesia of 35 seconds is four to six gallons, and the time necessary for such administration is from 45 to 80 seconds, the average being about 50 seconds.

A convenient position for the anæsthetist, and one that gives him the maximum of control over the patient, is to stand behind the chair and apply the face-piece with both hands. Some prefer, however, to stand at the side, applying the face-piece with one hand and feeling the pulse with the other.

There are two well-marked signs of anæsthesia, Jactitation and Stertor, in addition to Cyanosis, the result of Oxygen starvation.

The margins of the ears, the finger-nails, and a nævus, if present, become first of all tinted a greyish-blue colour, which then changes to a blue-black in the deepest narcosis, and affects all the skin and mucous membranes.

The *Jactitation* begins in the fingers, and consists of clonic contractions, first of the phalangeal flexors, then of the wrist flexors, and then of the elbow flexors. The eyelids and eyeballs twitch at the same time. The muscles of the legs contract irregularly; usually the toes are drawn down, while the ankles, knees, and hips are extended. *Opisthotonos* is apt to supervene at this point, especially in females and children.

The *Stertor* is practically due to jactitation of the muscles which elevate the larynx, and indicates grave disturbance of respiration, little if any air reaching the lungs.

One at least of these cardinal signs is present in every simple Nitrous Oxide Anæsthesia if pushed to the usual limit.

Among the other signs are **Abolition of Superficial Reflexes**, and the condition of the **Pupils**. The superficial plantars and the conjunctival reflexes are, as a rule, absent in the later stages of the administration. In some cases the corneal reflex disappears as well. But it is useless and indiscreet to test the conjunctival reflex continually from the moment the face-piece is applied until the patient is fully anæsthetised. I have seen cases repeatedly where this reflex has persisted throughout the operation, while the cardinal signs were present, and no pain whatever was felt. The eyeballs roll upwards to the right or left while the anæsthesia is deepening and the pupils dilating.

One of the earliest moments of anæsthesia is recorded by the non-reaction of the pupils to light. After the patient has been breathing well for about twenty seconds, there is a far-away expressionless

stare in the eyes, with slightly dilated pupils and abolition of the light reflex. If the gas be continued for two or three inspirations further, one, or possibly two, loose teeth can be extracted without occasioning pain. No time should be lost between the removal of the face-piece and the application of the forceps; moreover the operation should be done rapidly. This method is convenient when there is evidence of a distended right heart and venous hyperæmia. It is very undesirable in these cases to push the gas to the usual extent, for by so doing the cyanosis becomes very intense, the strain on the heart is accentuated, and the already existing asphyxia of the tissues exaggerated.

Thus the administration of Nitrous Oxide may be stopped (1) where the light reflex fails, or (2) it may be continued until one or more of the cardinal signs appear. When it is pushed to the stage beyond, viz. where the respirations have ceased, the heart beating tumultuously, the colour of the face more black than blue, and the pupils dilated to the extreme, the condition is one of great peril, and may require all the anæsthetist's resources to combat the tendency to death.

For the large majority of cases, the most satisfactory time to **stop the administration** is when the three chief signs are appearing, the respirations becoming slow and stertorous, the colour of the face slightly bluish, and the fingers beginning to twitch. From one to six teeth, or even more, can be extracted if they are fairly easy. It is wiser, as a rule, to operate on the worse side of the mouth at first, and postpone

further extractions on the other side for a week or so.

If the case is a difficult one, an extension of eight or ten seconds is a desideratum. To secure this a useful device is to administer the gas in two doses, with two full inspirations of air sandwiched, so to speak, between them. The air should be admitted just as the cardinal signs are beginning to appear, and the administration then continued till these signs reappear and become well-marked. This method is easy, effectual, and requires no additional apparatus. The strain on the heart is slightly greater, and the cyanosis somewhat deeper.

Another manœuvre to afford the dentist more time is to use Buxton's gas and ether apparatus, as described above. After six good inspirations of gas, ether should be admitted gradually at first, then stronger, until all the gas reaching the lungs has passed over the ether first. Ten, twenty, or thirty inspirations, according to the exigencies of the case, should be permitted, and then the anæsthesia precipitated by shutting off the ether and admitting the gas alone.

This method gives the dentist an extra ten to thirty seconds over the anæsthetic period afforded by nitrous oxide only. A still further extension of anæsthesia may be obtained by disconnecting the india-rubber tube at *m* (see fig. 2), and allowing air to pass over the ether in the receiver C and be inspired for two, three, or five minutes, according to the length of time the operation is likely to take.

The combination of gas and oxygen provides not only an anæsthesia free from cyanosis, jactitation,

and stertor, but also causes an anæsthesia about ten seconds longer than the average gas period.

It may not be out of place to indicate here that the Dental Surgeon may desire the destruction or avulsion of the nerve of a tooth, or he may find it necessary to drill into the Antrum, in all of which cases an extension of anæsthesia may be invaluable.

DIFFICULTIES AND PRECAUTIONS

During the return to consciousness absolute silence should be observed, the eyes gently closed, the mouth covered with a napkin, and the head held in such a position that the blood may not trickle back to the fauces.

Then the patient will hear and obey commands, such as the following, and in this order:—"Open your eyes," "open your mouth," "let me take the prop away," "lean forward," "spit out the blood," "hold the basin in both your hands," "wash out your mouth with this water," "see what you are doing."

The anæsthetist can usually give the dentist material help in the operation. If there are upper teeth to be extracted, he can steady the head by two forces applied by the hands to the sides of the head, and acting each downward, forward, and inward toward the middle line. The resultant of these two forces should pass in the same line, but in a contrary direction to that of the forceps, driven upward by the operator,

If there is a lower tooth to extract, the anæsthetist may, with his hands over the temporal and masseter muscles, hook his fingers under the mandible, so as to form a *point d'appui* for the steady application of the blades of the forceps, to say nothing of saving the patient from a possible dislocation.

Should the operator stand behind the chair, the anæsthetist might grasp the patient's hands, and press gently backwards on the abdomen to prevent any opisthotonos occurring.

When to **stop operating** is often a nice question. To wait for a distinctly intelligent movement or gesture, to watch for facial or other movements expressive of pain, is virtually a confession of the difficulty besetting the question, and clumsy guides to the uninitiated. There are two signs of value; the one the return of the normal colour, and the other the presence of the light reflex. If one could stop the operation just before the cyanosis disappeared, or at the moment when the pupils begin reacting to light, no pain would be felt. It is undoubtedly wrong to operate when the pupils respond actively to light.

Sometimes patients will say they felt the pain of the whole operation, and this even where all three cardinal signs of anæsthesia were present. On further questioning, however, they often admit that they felt no pain as such, and they are unable to say which tooth was extracted last. In cases such as these, it would be wise on a future occasion to deepen and lengthen the anæsthesia by administering Gas and Ether.

More rarely still one notices the unconsciousness and anæsthesia prolonged much beyond the normal. The pulse and respirations are regular and tranquil, and there is no cyanosis. Possibly the patient is in a condition allied to the hypnotic state.

If dislocation of the Temporo-maxillary joint has occurred, reduction should be effected before the return of consciousness if possible.

No fragments of teeth, &c., should be allowed to remain in the mouth during an operation, the anæsthetist assisting the dentist by bending the head somewhat forward.

In the case of children the administration should be brought to an end just before jactitation, because opisthotonos occurs early in them, and interferes with the operator considerably.

The habitual drunkard is notoriously troublesome, requiring as he does more gas than usual to produce anæsthesia, and then becoming intensely cyanotic after the face-piece has been removed. Not only this, but he manifests pugilistic propensities during recovery. Absolute silence during the administration, and a gradual awakening, are the two precautions of greatest service. The same remarks may be applied not only to those addicted to the Opium, Morphia, or the Chloral habit, but also to athletes and men of powerful physique.

There are nervous excitable people who work themselves into a fever of apprehension and dread of the operation, or the gas. With them no effort should be spared to win their confidence, and put them completely at their ease. The anæsthetist's tact and

persuasive powers will probably overcome their terror, and the administration will proceed to a perfectly successful conclusion.

Children and anæmic adults take less than the average quantity of gas, the period of administration is brief, and the narcosis short in consequence.

Pregnancy is, as a rule, no bar, but it is wiser to give the gas to a moderate degree only, contenting oneself with a small operation. Some deprecate administering it during the month or six weeks before the confinement is expected. Especially should this precaution be observed in regard to patients who habitually miscarry.

Now and then **Hysterical** symptoms are manifested during recovery, or some minutes afterwards. Here Ammonia to the nostrils, or a faradic current if convenient, and a not too ready sympathy are indicated.

If failure of the pulse, marked pallor or feeble breathing point to threatened **Syncope**, the patient should be placed in the supine or inverted position, while abundance of fresh air is supplied. A capsule of Amyl Nitrite should be broken in a handkerchief and placed under the nose, and artificial respiration performed. Smelling salts should be applied to the nostrils, and brandy injected *per rectum*; Ether (15 to 20 drops) may be injected hypodermically. It has been recommended to incise one or both anterior temporal arteries. Galvanism may be useful, the negative pole being placed over the heart, and the positive pole at the nape of the neck. The current should be made and broken about fifty times per minute.

If **Asphyxia** be imminent, owing to a foreign body

in the throat or upper opening of the larynx, this should be hooked out by the fingers or forceps if possible. The back should be smartly slapped and head bent forward. Inversion may be next attempted, but if the dyspnœa is becoming more urgent the windpipe must be opened, laryngotomy being done in an adult, laryngo-tracheotomy in a child. Immediately air enters the lungs the foreign body will be coughed up. Asphyxia seems to be due at times to the patient, as it were, swallowing his tongue. This is already engorged, and dyspnœa is at once apparent. The chin should be elevated and the head extended, or the tongue drawn forward with the tongue forceps.

Should the breathing cease for a period of fifteen seconds, Snow advises that artificial respiration be performed, but surely any hard and fast rule such as this is unwise. There may be patients in whom three or four seconds of arrested breathing are as perilous as fifteen seconds are to others, and therefore in resorting to **Artificial Respiration** *there should be no delay.*

Occasionally an **Epileptic Fit** occurs some few minutes after recovery. The clothing should be loose around the neck, and a piece of wood inserted between the teeth to save the tongue from being bitten when the clonic spasms come on.

In concluding this brief survey of general anæsthesia from the dentist's standpoint, one must confess that the whole subject is full of unsolved problems, and to the thoughtful mind there is ample, and one may say increasing scope for accurate observations and their true interpretation.

Presuming that the drugs administered are of un-

deviating chemical purity, one has to deal with individuals of different age, sex, race, and temperament; some there are whose nerve-centres are overflowing with potential energy, while others manufacture at these spots no more than what they can readily control. Again, when one speaks of an axis-cylinder, the relation of its fibrils to a central cell, the subserviency of such cell to loftier ones, the nature of nerve force, the chemical constitution of nerve matter, the inter-atomic motion, if such there be, and the indispensable throb in every part which we call Life, we stand face to face with questions and phenomena that have baffled the keenest research. And yet, in producing general anæsthesia, how profound must the changes be in these very nerve tissues, their functions and their vitality!

Certain principles have been stated, certain lines of action advocated; and if to the reader they appear arbitrary at times, let him remember that they have been tried in the school of experience and found invaluable.

The first of these was the discovery of gold in California in 1848. This discovery led to a great influx of people to California, and the state became a great center of population. The second was the discovery of gold in Nevada in 1859. This discovery led to a great influx of people to Nevada, and the state became a great center of population. The third was the discovery of gold in Colorado in 1858. This discovery led to a great influx of people to Colorado, and the state became a great center of population. The fourth was the discovery of gold in Arizona in 1863. This discovery led to a great influx of people to Arizona, and the state became a great center of population. The fifth was the discovery of gold in New Mexico in 1861. This discovery led to a great influx of people to New Mexico, and the state became a great center of population. The sixth was the discovery of gold in Texas in 1856. This discovery led to a great influx of people to Texas, and the state became a great center of population. The seventh was the discovery of gold in Florida in 1845. This discovery led to a great influx of people to Florida, and the state became a great center of population. The eighth was the discovery of gold in Georgia in 1842. This discovery led to a great influx of people to Georgia, and the state became a great center of population. The ninth was the discovery of gold in Alabama in 1840. This discovery led to a great influx of people to Alabama, and the state became a great center of population. The tenth was the discovery of gold in Mississippi in 1838. This discovery led to a great influx of people to Mississippi, and the state became a great center of population.

The discovery of gold in California in 1848 was the first of a series of discoveries that led to the great influx of people to the western states. The discovery of gold in Nevada in 1859 was the second of a series of discoveries that led to the great influx of people to the western states. The discovery of gold in Colorado in 1858 was the third of a series of discoveries that led to the great influx of people to the western states. The discovery of gold in Arizona in 1863 was the fourth of a series of discoveries that led to the great influx of people to the western states. The discovery of gold in New Mexico in 1861 was the fifth of a series of discoveries that led to the great influx of people to the western states. The discovery of gold in Texas in 1856 was the sixth of a series of discoveries that led to the great influx of people to the western states. The discovery of gold in Florida in 1845 was the seventh of a series of discoveries that led to the great influx of people to the western states. The discovery of gold in Georgia in 1842 was the eighth of a series of discoveries that led to the great influx of people to the western states. The discovery of gold in Alabama in 1840 was the ninth of a series of discoveries that led to the great influx of people to the western states. The discovery of gold in Mississippi in 1838 was the tenth of a series of discoveries that led to the great influx of people to the western states.

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