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NOTES  
ON  
MATERIA MEDICA

PHARMACOLOGY AND THERAPEUTICS,  
FOR  
DENTAL STUDENTS AND PRACTITIONERS.

BY  
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## PREFACE.

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THESE "Notes" were originally designed for the use of students proceeding to the examination for the L.D.S. England. It is hoped, however, that they may also prove of some service to the dental practitioner.

It need hardly be said that this volume does not claim to be a complete treatise upon the so-called Dental Materia Medica, nor, indeed, anything more than an attempt to set down as briefly and in as practical a manner as possible, those properties, actions, and applications of drugs which are of utility or interest to the dental surgeon.

For this reason any description of the *general* therapeutic action of drugs has been omitted, except in cases where it has been considered that such therapeutic action approaches nearly to the border-line which, for the sake of convenience, divides dental from general medical practice. Of many drugs, which find a place in larger works on the subject, all description has been left out, either from their doubtful utility or from a desire to avoid confusion, which would be caused by multiplying descriptions of those having an identical action. Others, again, have been inserted with a view either of completing the classification of pharmacological groups, or their



properties described as a warning against their employment save by the qualified physician. It will be noted that in many instances in Part II. all *Materia Medica*, doses, and prescriptions have been purposely omitted.

It has seemed to the Authors that on the whole the pharmacological classification of drugs is the most practical one for the dentist, and this has accordingly been adopted, though open to the objection that it involves a good deal of cross-reference, and a certain amount of unavoidable repetition.

The thanks of the Authors are due to Mr. W. F. Mellersh and Mr. Harvey Hilliard for kind assistance with the sections on Bleaching and General Anæsthetics respectively.

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		Text-Book of Pharmacology and Therapeutics.
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<i>Quain</i>	. . . . .	Dictionary of Medicine.
<i>Martindale and Westcott</i>	. . . . .	The Extra Pharmacopœia.
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<i>Sollmann</i>	. . . . .	Pharmacology.

Dental Hospital of London Pharmacopœia.

## INTRODUCTION.

**Therapeutics.** (Θεραπεία, I attend, treat.)

The science relating to treatment of disease by remedial measures.

Therapeutic measures are conveniently divided into :—

1. Surgical.
2. Medical.

Though there is no hard and fast line to be drawn between the two. Medical therapeutics include not only treatment by drugs, but also by varied means, such as diet, climate, electricity, etc.

Dental therapeutics are mainly of a surgical nature, though drugs are of such use as to be indispensable.

The dentist, no less than the general physician or surgeon, should consider it his highest aim to guard against disease by the adoption of preventive and hygienic measures rather than to effect cures.

**Pharmacology.** (Φάρμακον, a drug.)

Deals with action of medicines upon healthy and diseased tissues.

Drugs or medicines are employed in dentistry,

### 1. COMMONLY.

- a. For direct action on living tissues in the mouth.

**Example.**—Arsenic used to destroy vitality of pulp.

- b. For direct action on germs or micro-organisms.

**Example.**—Peroxide of hydrogen used to disinfect foul roots.



*c.* Action on products of decomposition.

**Example.**—Permanganate of potash mouth-wash after extraction of teeth.

*d.* For their purely physical action.

**Example.**—Chloroform to act as a solvent of gutta-percha used in root filling.

2. FREQUENTLY.

For general constitutional effects ; such as production of general anæsthesia, and treatment of untoward symptoms that may arise in the consulting-room.

**Example.**—Sal volatile in the treatment of syncope.

3. MORE RARELY.

For indirect action upon morbid states of the mouth or teeth, the primary effect being produced in some other part of the body.

**Example.**—Administration of a purgative in cases of acute periostiteal inflammation.

Although the majority of drugs employed in dental practice are made use of for their local rather than for their general effect, constitutional symptoms may be produced accidentally (idiosyncrasy to particular drug, accidental poisoning). Therefore it is important to be acquainted with the pharmacological action of the drugs employed.

**Note.**—That the same drugs may have different action when employed in different strengths or doses.

**Toxicology.** (τοξίκον, arrow-poison.)

The science which treats of poisons and their antidotes.

Some drugs which are not poisonous in ordinary doses are poisonous when administered in large doses.

**Example.**—Chlorate of potash.



Others again are not rapidly eliminated, and frequent small doses may accumulate in the body and so cause poisoning.

**Example.**—Mercury.

The dentist should be acquainted with the possibly poisonous properties of all the drugs he employs, as a preventive against accidents. Also with the appropriate antidotes and remedies, that should an accident unfortunately occur, he may be able to furnish assistance without loss of time.

All bottles, boxes, or packets containing drugs should be labelled at once, and in the case of poisonous drugs **POISON** should be clearly written on each.

### **Materia Medica.**

The substances or materials used in medical treatment, their names, sources, characters, and properties, and the doses in which they should be administered.

In dentistry, no less than in general medicine, an acquaintance with at least the important characters and properties of the drugs employed is essential. Thus may be avoided the disappointment caused by an old solution of cocaine, or the attempt to disinfect steel instruments with a solution of perchloride of mercury.

### **Pharmacy.** (Φαρμακευτική.)

The art of

- (i) Making preparations from crude materials.
- (ii) Dispensing prescriptions.

The details of practical pharmacy do not concern the dentist, though a knowledge of terms is advisable. Remedies of unknown composition should be rejected.

### **Pharmacopœia.** (Φάρμακον, and ποιέω, I make.)

A standard list of drugs and their preparations. It is published by Government authority. Drugs



and preparations of this list are termed "official." The maximum doses that should be employed and the minimum doses likely to be of effect are indicated in the B.P., which also contains much information to the pharmacist.

By means of the "Pharmacopœia" uniformity and standardisation is obtained, and a valuable means of communication established between the prescriber and the chemist, as all "official" drugs and their preparations have to be dispensed in accordance with "Pharmacopœia" standards.

When it is desired to employ non-official preparations (and these are frequently useful) their nature must be clearly indicated in the prescription where any doubt exists. (Example: Tr. Aconiti (Fleming), a non-official preparation 5 times as strong as the Tr. Aconiti of the B.P.).

Remember that in foreign countries, where our patients may require their prescriptions dispensed, there are other "Pharmacopœias" differing from the British.

### Pharmaceutical Preparations.

Some drugs, chiefly inorganic, are employed in their natural state, or as substances of definite chemical composition.

**Example.**—Perchloride of mercury, oil of cloves.

Others are commonly used in the form of preparations of various kinds, such as :—

*Aquae* (waters) and *Liquores* (solutions) substances dissolved in water.

In the U. S. P. "Liquors" correspond to the "Aquae" of the B. P.

*Injectiones Hypodermicae* (hypodermic injections), strong solutions of an active drug for administration under the skin by means of a syringe and needle.

**Mucilagines.** Aqueous solutions of gummy substances.

**Glycerini.** Solutions of substances in glycerine.  
(U. S. P., "Glycerita.")

**Tincturae** (tinctures). Alcoholic solutions.

**Trochisci** (lozenges). Dried tablets of sugar, gum, or a fruit base, mucilage and one or more active ingredients.

**Pulveres** (powders).

**Cataplasmata** (poultices).

And very many others, concerning which, and the details of these, a larger work must be consulted, as they possess little interest for the dental practitioner.

---

## Weights and Measures in common use:

### I. The Imperial System.

In prescribing, the symbols or abbreviations are frequently used.

#### Weights.

The grain (granum). gr.

The drachm (drachma) = 60 grains. ℥.

The ounce (uncia) = 437.5 grains. ℥.

The pound (libra) = 16 ounces. lb.

A 20 grain weight called the scruple, ℥, is now generally discarded.



**Measures.**

The minim. (minimum), min. or m.

The fluid drachm = 60 minims, fl. dr. or f $\bar{3}$ .

The fluid ounce = 8 fluid drachms, fl. oz. or f $\bar{3}$ .

The Pint (octarium) = 20 fluid ounces, O.

The Gallon (congius) = 8 pints, C.

**Note** that the drachm (a non-official weight) is not the 8th part of an ounce as in the fluid measure.

**Convenient Domestic Measures.**

Not, however, to be employed where accuracy is desirable.

1 drop = (very roughly) 1 minim.

1 teaspoonful = (roughly) 1 fluid drachm.

1 tablespoonful = (roughly)  $\frac{1}{2}$  a fluid ounce.

1 tumblerful = 10 to 12 fluid ounces.

**Table of Percentage Solutions.**

Per-centage.	1 fluid drachm.	1 fluid ounce.	1 pint.	Parts.
1.	gr. 0.547	gr. 4.375	gr. 87.5	1 in 100.
2.	gr. 1.094	gr. 8.750	gr. 175.0	1 in 50.
3.	gr. 1.640	gr. 13.125	gr. 262.5	1 in 33.33.
4.	gr. 2.187	gr. 17.500	gr. 350.0	1 in 25.
5.	gr. 2.734	gr. 21.875	gr. 437.5	1 in 20.
6.	gr. 3.281	gr. 26.250	gr. 525.0	1 in 16.66.
7.	gr. 3.828	gr. 30.625	gr. 612.5	1 in 14.28.
8.	gr. 4.375	gr. 35.000	gr. 700.0	1 in 12.5.
9.	gr. 4.922	gr. 39.375	gr. 787.5	1 in 11.11.
10.	gr. 5.468	gr. 43.750	gr. 875.0	1 in 10.

**II. The Metric or Decimal System.**

Is now official as well as the Imperial, but is not as yet in common use in prescribing (though exclusively used for pharmaceutical testing), so is not given here.

On the Continent of Europe the metric system is the only official one; all liquids, as well as solids, are weighed, and the weight expressed in grammes.

**Relation between Imperial and Metric Systems.**

A few relations easy to remember, but approximate only :—

1 cub. centim.	=	m. xvij.
4 cub. centim.	=	f. 3 j.
30 cub. centim.	=	f. $\frac{3}{4}$ j.
gr. j.	=	65 milligrams.
gr. jss.	=	10 centigrams.
gr. lx.	=	4 grammes.
$\frac{3}{4}$ j. (avoirdupois)	=	30 grammes.
lb. j	=	$\frac{1}{2}$ kilogramme.

**PRESCRIBING.**

The art of selecting remedies and ordering them (either alone or in suitable combination) for the treatment of diseases. Usually embodied in a recognised written form called a prescription.

The dentist is frequently called upon to prescribe a suitable mouth wash (collutorium) or dentifrice, and other local applications. Less frequently to order a purgative, gargle, or anti-neuralgic remedy. As a general rule, however, administration of internal remedies is best left to medical practitioners.

**Points to be considered in prescribing.**

i. Selection of the remedy or remedies most appropriate to the case it is desired to treat when several are available.

This is an important test, not only of pharmacological knowledge, but also of the disease to be treated.

**Example.** — In prescribing a mouth wash the dentist should consider such points as whether it is specially required to deodorise the breath, exercise an astringent action on the mouth, act as an antacid, etc., and select the drugs accordingly.



ii. Consider what preparations of the remedy it is most desirable to employ.

**Example.**—In prescribing Iodine as a counter-irritant application, it may be used as the Liquor Iodi Fortis, or the weaker Tincture, according to the case.

iii. Consider mode of administration.

**Example.**—Mercury given for the cure of syphilis may be administered by the mouth, by inunction, by fumigation, or by hypodermic injection, and in any of these ways produce constitutional effects.

iv. Consider strength in which it is desirable to employ remedy.

If for internal administration, the suitable dose.

As stated above, the Pharmacopœia indicates the limits of ordinary doses.

A useful method of reckoning doses for children under 12 is to divide the age in years by the age in years + 12, and use the result as the fraction of an adult dose that should be given. Thus for a child of 8 the dose will be  $\frac{8}{8+12} = \frac{2}{5}$  of an adult dose.

Above 12 and under 21, give between  $\frac{1}{2}$  and a full dose. Other conditions besides age modify doses, such as idiosyncrasy, habit, and disease, but the question is too general to be discussed here.

v. Consider frequency with which it is desirable that the remedy should be used.

**Example.**—Morning and evening (*nocte maneque*). Every four hours (*quartis horis*). Three times a day (*ter die*). Occasionally (*pro re nata*).

vi. Consider duration of period over which it is desirable that treatment should extend.

**Example.**—Harm may be done by too long application of strong lotions to the mucous membrane of the mouth.

vii. Consider suitable combinations where more than one drug has to be used at the same time.

Each constituent of a prescription may be used to have a different effect, or the same effect, though in the latter connection be careful not to "overdo" matters by prescribing (for example) a dozen different antiseptics in the same mouth-wash.

Remember that even the appearance and taste of mixtures are worthy of consideration.

viii. Avoid combining drugs which are chemically or physiologically incompatible.

It is as well to bear in mind, though unlikely to occur in the dental practitioner's limited *materia medica*, that some drugs act on each other chemically, producing inert substances, poisonous compounds, or explosive mixtures.

**Example.**—Permanganate of potash or chlorate of potash, being rich in oxygen, should not be mixed with readily oxidisable substances, such as charcoal, carbolic acid, or glycerine.

## Prescriptions are written as follows:—

### I. IN LATIN.

1st. The **Superscription**, which is the sign  $\mathcal{R}$ , now used as an abbreviation for "Recipe" (*Take of*), though originally it was a sign for invocation to Jupiter.

2nd. The **Transcription**, consisting of the names of drugs in the genitive case, and their doses in the accusative. It is more correct to write the name of the *vehicle* in the accusative when followed by "ad."

3rd. The **Subscription** or direction to the dispenser written in Latin.



4th. The Signature, or directions to the patient; usually written in English.

5th. The prescriber's initials or name, and the date.

The name of the patient should also be written either above or below the prescription, to one side.

Example :—

Superscription. R.

Transcription. *Liquoris Ferri Perchloridi* m. ij.  
*Potassii Chloratis* gr. iij.  
*Aquam Aurantii* ad 3 j.

Subscription. **Misce.** Fiat mistura.  
 Mitte doses tales viij.  
 (or Mitte 3 j).

Signature. One teaspoonful to be taken three times a day after meals.

Initials and date. A B. 14/ 3/ '02.

Patient's name. Mrs. Smith.

Or abbreviations may be used, thus :—

*Liq. Ferr. Perchlor.* m. ij.  
*Potass. Chlorat.* gr. iij.  
*Aq. Aurant.* ad 3 j.

M. ft. mist. Mitte dos. viij.  
 &c., &c.

s. or ss. used as abbreviation for semis, a half, and  
 āā for ana, of each.

Remember never to use abbreviations which are ambiguous, such as *Ac. Hydroc.* (which may mean *Hydrocyanic* or *Hydrochloric*); *Hyd. Chlor.* (which may mean *Calomel*, *Corrosive Sublimate*, or *Chloral Hydrate*).

## II. IN ENGLISH.

This is less usual, but is best adopted when there is doubt as to the correct Latin to employ.

Example:—

*Take of (or R).*

*Solution of Perchloride  
of Iron*

*2 minims.*

*Chlorate of Potassium*

*3 grains.*

*Orange water to*

*1 fluid drachm.*

Dissolve and mix. Send 8 doses.  
&c., &c.

Avoid writing "hybrid" prescriptions, half in Latin and half in English, and be always careful to add the "Subscription" and "Signature."

When composing a prescription write down all the ingredients first, and add the quantities afterwards. This method will frequently save subsequent erasure.



## PART I.

## CAUSTICS.

**Caustics** (*καίω*, I burn) are substances which burn, corrode, or disintegrate the tissues.

Caustics may act by physical means, such as the actual cautery, or by withdrawing water from the tissues, as strong acids and alkalies. Or by chemical means, as with metallic salts, such as zinc chloride. Or again by causing inflammatory necrosis, as with some of the volatile organic irritants, such as chloroform and carbolic acid.

The **actual cautery**, in the form of a red-hot wire, is not now used by dentists for destroying the pulp, on account of the severe pain it caused and the practical difficulty of applying it effectually in most cases.

Caustics are also disinfectants, as they destroy the protoplasm of germs, but their use for this purpose in living tissues is to be as far as possible avoided, because :—

1. Whilst destroying the germs they also destroy the tissues, and so break down the natural means of resistance and repair.
2. By producing a slough they form a very favourable nidus for the further growth of any new germs which may arrive.

Caustic **hæmostatics** are open to the same objections.

In the case of spreading infective inflammatory diseases (*e.g.*, *cancrum oris*), where the tissues are

unable to cope with the germs, and in the case of small follicular ulcers, caustics are of use in destroying the diseased tissues and the disease at the same time, and allowing the healing process to start afresh.

For the destruction of new growths and polypi of the gum, caustics are very inferior to the knife, because :—

1. We are unable to accurately control the amount of tissue acted upon.
2. A mass of dead tissue is left behind which is very likely to become septic and set up inflammation and secondary hæmorrhage.

Caustics should therefore never be employed to remove epulides, but for the removal of polypi of the gum they have the advantage that they can more readily reach the part, and cause less immediate hæmorrhage.

Caustics, by destroying the vitality of uninflam-  
mable tissues, can prevent the transmission of sensation without causing any serious damage, and thus act as obtundents.

In the selection of a caustic the following points should be considered :—

1. The method of its action.
2. The depth to which it will penetrate.
3. The amount of pain it will cause.
4. The probability of keeping the slough aseptic.
5. Any staining action that may occur.

For the destruction of the dental pulp, without an anæsthetic, chemical caustics are usually the least painful method.



The degree of penetration of a caustic will depend upon :

1. Its volatility and solubility.
2. Its power of absorbing water from the tissues.
3. Whether it produces a coagulum or not ; and, in the former case, the solubility of the coagulum.
4. Whether it becomes chemically united to the tissues, and so neutralised, or not.
5. The density of the tissue.

The caustic action of drugs employed for other purposes should always be borne in mind and care exercised, lest they do more harm than good.

The following drugs, employed in dentistry for other purposes, have a caustic action :—Permanganate of potash, mercuric chloride, copper sulphate, ferric chloride, dried alum, kalium-natrium, pyrozone, sodium peroxide; chlorine, iodine ; sulphuric, chromic, trichloroacetic and phosphoric acids ; ammonia ; chloroform, formaline, salicylic acid, and also extreme cold.

### **Acidum Arseniosum.** ARSENIOS ACID $\text{As}_2\text{O}_3$ .

#### **Materia Medica.**

*Synonyms.* Arsenic, arsenious acid, white arsenic.

*Characters.* A heavy white powder, or in crystalline masses.

#### *Solubility.*

- 1 in 100 of water,
- 1 „ 500 „ alcohol,
- 1 „ 8 „ glycerine,
- 1 „ 11 „ liquor potasse.

*Incompatibles.* Salts of iron, magnesia, lime water, astringent matters.

*Dose.*  $\frac{1}{60}$  to  $\frac{1}{15}$  gr.

**Pharmacology.****CAUSTIC, ANTISEPTIC, TONIC.**

**CAUSTIC.** Applied to a healthy pulp it causes dilatation and increased permeability of the capillaries, death, and fatty degeneration of the cells and nerves. It does not cause coagulation of the tissues, nor chemically combine with them; hence penetration is very deep, but slow. If applied to a congested and septic pulp it sets up acute inflammation, and the resulting exudation causes such pressure on the apical vessels, affecting principally the thin walled veins, that circulation is stopped and death *en masse* of the pulp results.

Arsenic applied in the form of a paste to an ulcer on the skin, and carefully covered over, causes acute inflammation and dry gangrene, the part separating in three or four weeks as a mummified slough, and usually leaving a cicatrix. This limitation of action by the formation of a cicatrix appears to explain why large applications of arsenic to the pulp, or an application to an inflamed pulp, is not so effectual as a small application to a normal pulp.

**ANTISEPTIC.** Arsenic is antiseptic in the strength of 1 in 16.

**TONIC:** No use is made of this property in dentistry.

**Therapeutics.**

**CAUSTIC.** Arsenic is used to destroy the dental pulp.

It must be carefully applied :—

1. Place in contact with the pulp tissue, or its action will be slower; but arsenic is able to penetrate through a thick layer of dentine.
2. Apply it without pressure, so that the pulp may expand a little during the first action of the drug.



3. Seal it in water tight, or else some may escape on to the gum, where, if not quickly washed away by the saliva, it will destroy the gum and even the alveolus also if left long enough.

In the latter event, the treatment is to remove the dressing and all dead tissue, wash away the arsenic with jets of **warm water**, then neatly fill the cavity, leaving no overlap, and prescribe an **antiseptic mouth-wash**.

One sixteenth of a grain of arsenic is enough to kill a pulp in about 48 hours ; more should not be used, and it is unwise to leave a dressing much longer.

Some people are very susceptible to the action of arsenic, even in small doses.

If a large dressing is left in a tooth for a long time, it will penetrate the dentine and destroy the periosteum, causing the tooth to loosen and fall out.

*Acetate of morphine* and *arsenic*, in equal parts, are as efficient and often less painful than arsenic alone.

To relieve the pain caused by a properly applied arsenic dressing, **Iodine** may be applied to the gum and 5 grs. of **Phenacetin** administered internally every hour for three hours.

Arsenic is the active ingredient of "*Devitalising Fibre*" and "*Paste*," formulæ for which are :—

R.

<i>Arsenious acid</i>	gr. 5
<i>Tannin</i>	gr. 2
<i>Acetate of morphine</i>	gr. 10
<i>Carbolic acid enough to make a thin paste.</i>	
<i>Absorbent cotton wool, finely cross cut, q.s.</i>	

Mix the paste with the cotton wool and allow to dry.

R.

<i>Arsenious acid</i>	2 parts
<i>Morphine acetate</i>	1 part
<i>Creasote to make a stiff paste</i>	

A quantity the size of a pin's head is enough to destroy the pulp.



Pulp stones, such as are often found in the pulps of young gouty subjects, arrest the action of arsenic and cause violent pain, possibly by the swelling above pressing the pulp stone into the pulp below. In such cases it is better to administer an anæsthetic and remove the obstruction.

Absorption starts in the roots of temporary centrals and laterals soon after their completion, so that it is never safe to depend on these roots being complete; the canines are complete from about the 5th to the 8th year; the first molars from about the 5th to the 7th year; the second molars from the 6th to the 8th year; the permanent teeth have their roots completed about three years after their eruption.

Whilst the roots are incomplete an arsenical dressing must not be left in the tooth for more than 12 hours, and the avoidance of its use at all is to be desired.

The caustic action of arsenic may be employed as an obtundent of sensitive dentine in very shallow cavities. It must not be left in contact with the tooth for more than two hours, and the carious dentine must then be very fully removed. It is very effective, but very dangerous to the pulp. It acts by destroying the vitality of the dentinal fibrils without coagulating them, hence the dangerous depth of penetration.

**ANTISEPTIC.** The antiseptic action of arsenic will tend to prevent putrefactive changes in the pulp after its destruction, but it is not powerful enough to be relied on to disinfect an already infected pulp.

After devitalisation by arsenic, the application of a dressing of **tannin and carbolic** will, in a few days, render the pulp harder and more easy of removal; it will also help to prevent putrefaction, and hasten the death of a half dead pulp.



**Toxicology.**

2 grs. of arsenic have killed a man.

*Symptoms of acute poisoning.*

Intense burning pain in throat and stomach.

Faintness, nausea, sickness.

Thirst, vomiting, purging.

Restlessness, cramp, collapse.

*Treatment.*

Wash out the stomach, or give an emetic.

Ferric hydrate (1 oz. of *Tr. ferri perchlor.* and 1 oz. of washing *soda* in water).

Brandy and morphine.

From external applications arsenic may be absorbed and cause poisoning.

**Zinci Chloridum. ZINC CHLORIDE,  $ZnCl_2$ .****Materia Medica.**

*Dose.* Not given internally.

*Characters.* A white, granular, odourless, intensely caustic, deliquescent powder.

*Solubility.*

10 in 4 of water,  
1 „ 1 „ alcohol,  
1 „ 4 „ glycerine,  
freely in ether.

*Incompatibles.* Lime water, alkalies, and their carbonates, tannin.

*Preparations.* *Liquor Zinci Chloridi* (80%).

## Pharmacology.

CAUSTIC, ANTISEPTIC, DISINFECTANT,  
ASTRINGENT.

CAUSTIC. Zinc chloride belongs to the class of metallic salts, which act by the metal coagulating and entering into chemical union with the tissues to form an albuminate; the acid radicle, being liberated, also acts on the tissues as an acid, in addition to which chemical actions there will be the physical effect of the solution setting up osmotic currents, and so affecting the structure of the cells.

In this particular salt the zinc combines with the tissues to form an albuminate, which is slightly soluble; the acid radicle is a powerful acting one, all of which, combined with the ready solubility of the salt itself, make it a powerful and penetrating caustic.

ANTISEPTIC AND DISINFECTANT. See p. 66.

ASTRINGENT. See p. 38.

## Therapeutics.

CAUSTIC. Zinc chloride is used to reduce the sensitiveness of dentine, especially the shallow cavities on the necks of the front teeth. It is applied to the dried tooth in the form of the solid salt and allowed to deliquesce. It causes severe pain at first, and care must also be taken to prevent it running over the gum. It soon reduces the sensibility of the dentine, but does not penetrate very deep, and may have to be reapplied several times to entirely remove sensation.

As an ingredient in the *Oxychloride* cement it was formerly used to reduce the sensibility of deeper cavities, but was a somewhat heroic form of treatment.

ANTISEPTIC. See p. 66.

## Toxicology.

6 grs. have killed a man.

*Symptoms of poisoning.*

The same as with mineral acids.



*Treatment.*

It usually causes vomiting itself.  
Give albumin (white of egg or milk) and soda.  
Morphine and brandy.

**Argenti Nitras.** SILVER NITRATE,  $\text{AgNO}_3$ .**Materia Medica.**

*Synonyms.* Lunar caustic.

*Dose.*  $\frac{1}{3}$  to  $\frac{1}{8}$  gr.

*Solubilities.* 2 in 1 of water,  
1 „ 18 „ alcohol.

*Incompatibles.* Alkalies and their carbonates, all bromides, chlorides, iodides and phosphates, solutions of arsenic and tannin, alkaloids.

**Pharmacology.**

CAUSTIC, ASTRINGENT, STIMULANT, ANTISEPTIC,  
DISINFECTANT, STYPTIC.

CAUSTIC. Acts in a similar way to zinc chloride. The silver quickly combines with the tissues to form an insoluble albuminate, which limits the penetration to a very superficial layer.

ASTRINGENT AND STIMULANT. See p. 38.

ANTISEPTIC AND DISINFECTANT. See p. 65.

STYPTIC. See p. 52.

**Therapeutics.**

CAUSTIC. The caustic action of silver nitrate is principally of use in destroying the dentinal fibrils, and so obtunding sensitive dentine. It does not penetrate deeply. It is more effectual and less painful in its action than zinc chloride, but, unfortunately, stains the dentine a permanent black. Dentine so stained

and exposed to the free cleansing action of the tongue and tooth brush is less liable to decay.

Silver nitrate may be used to destroy the sensitive-ness of an exposed pulp where arsenic is contra-indicated, but its action, though painless, is very shallow on account of the barrier of coagulated albumen it produces.

The caustic and disinfectant action of silver nitrate may be usefully employed in the destruction of single follicular ulcers of the gum. It is only necessary to touch the ulcer lightly after washing away the *débris* over it with a swab of cotton wool. The effect is to destroy the germs and superficial tissues, and form an antiseptic protective scab over the wound, also to constrict the vessels and stimulate the tissues beneath.

Silver nitrate must never be applied in the solid form about the mouth without being first firmly fused to a piece of silver or platinum wire. Crystals must never be held in the dressing forceps, or an ordinary holder employed.

A case is recorded of a small portion of silver nitrate escaping from the surgeon's hold, and lodging in the larynx, from a sudden movement of the patient. Death resulted from œdema glottidis.

ASTRINGENT AND STIMULANT. See p. 38.

ANTISEPTIC AND DISINFECTANT. See p. 65.

### Toxicology.

50 grains have killed a man.

#### *Symptoms of poisoning.*

Pain in the œsophagus and stomach.

Vomiting, purging.

Cramp, collapse.

#### *Treatment.*

Wash out the stomach with *salt and water*.

Albumin.

Stimulants.



**Acidum Nitricum.** NITRIC ACID,  $\text{HNO}_3$ .**Materia Medica.**

*Dose.* 1 to 5 min. (diluted).

**Pharmacology.**

## CAUSTIC, DISINFECTANT.

**CAUSTIC.** Acids act as caustics by depriving the tissues of water, by forming acid albumins (which are soluble in strong acids, and so do not form a protective barrier), and by softening the connective tissues.

**DISINFECTANT.** They are thus also destructive to germ life.

**Therapeutics.**

**CAUSTIC.** The caustic action of nitric acid has been made use of to destroy the dental pulp; the drug is applied to the surface of the pulp, and as soon as a slough has formed it is gently cut away and more acid applied: it is thus possible with very little pain to destroy a pulp in about half an hour. Should any of the acid come in contact with the enamel it will, of course, damage it seriously.

**DISINFECTANT.** Pure nitric acid and "*fuming nitric acid*" are sometimes used as disinfectant caustics to destroy parasitic germs in cases of rapid spreading gangrenous inflammation, such as cancrum oris; the drug is applied to the bleeding surface left after scraping away the sloughs.

**Toxicology.**

1 fluid drachm has killed a man.

*Symptoms of poisoning.*

Violent burning pain in throat and stomach.

Retching and vomiting.

Excoriation of the mouth.

Dysphagia, dyspnœa, thirst.

*Treatment.*

Do not use a stomach-pump.

$\frac{1}{2}$  oz. of *magnesia, chalk, soda*, or whiting.

Morphine hypodermically.

Nutrient enemata for feeding afterwards.

Stimulants.

**Potassii Hydras. POTASSIUM HYDRATE, KOH.****Materia Medica.**

*Synonyms.* Caustic potash, potassa caustica.

*Dose.* Not given internally.

*Characters.* White pencils, hard but very deliquescent, and alkaline.

*Solubility.* 2 in 1 of water,  
1 „  $3\frac{1}{2}$  „ alcohol,  
1 „ 3 „ glycerine.

*Preparations.* *Liquor potasse.* (5% U.S.P.; 6.2% B.P.)

*Dose.* 15 to 60 min.

*Potassa cum calce.* (U.S.P.)

Equal parts of caustic potash and slaked lime ( $\text{Ca}(\text{OH})_2$ ).

*Vienna paste.*

The above mixed with glycerine or alcohol.



**Pharmacology.****CAUSTIC, CLEANSING, ANTACID.**

**CAUSTIC.** Solid alkalies or strong solutions of them, act as caustics by depriving the tissues of water, and by forming alkali-albumins; these are very soft and soluble, so that the action penetrates very deeply.

**CLEANSING.** See p. 85.

**ANTACID.** See p. 85.

**Therapeutics.**

**CAUSTIC.** *Potassa cum calce* is a very useful means for destroying polypi of the gum or pulp, but great care must be taken when using it. It is liable to penetrate much further than is desired. When using it the gum should be cleansed and dried, and the access of saliva prevented as far as possible. A small portion should then be applied to the gum and its action watched. As soon as the apple-jelly-like slough has formed it should be cut away, and the part well syringed with warm water. A second application can be made if necessary, but the drug should never be left on the part. It is very apt to cause pain. The lime is added to dilute and retard the action of the alkali.

**CLEANSING.** See p. 85.

**ANTACID.** See p. 85.

**Liquor Sodii Ethylatis. SOLUTION OF ETHYLATE OF SODIUM.****Materia Medica.**

*Dose.* Not given internally.

*Characters.* A colourless syrupy liquid.

*Incompatible.* Chloroform.

*Composition.* It is made by dissolving 1 part of sodium in 20 parts of ethylic alcohol. It contains 19% of the solid salt  $\text{NaC}_2\text{H}_3\text{O}$ .

*Preparation.*

*Sodii Ethylatis*, the solid salt. Non-official.

Pharmacology.

CAUSTIC.

CAUSTIC. It acts by absorbing and combining with the water of the tissues. It soon becomes neutralised by saturation.

Therapeutics.

CAUSTIC. It is a mild caustic which does not penetrate very far, and may be employed to destroy polypi of the gum.

**Acidum Carbolicum.** See p. 75.

Pharmacology.

ANTISEPTIC, DISINFECTANT, CAUSTIC, LOCAL ANÆSTHETIC.

CAUSTIC. Pure carbolic acid acts as a caustic by producing a coagulation of the tissues, without entering into chemical combination with them; hence, not being neutralised by the tissues, it will penetrate deeper than the metallic salts, but the coagulum formed prevents really deep penetration.

Therapeutics.

CAUSTIC. Pure carbolic is useful for the destruction of the pulp in the teeth of children, when the root is incomplete, and may be left in contact with



the part under a dressing. In spite of its slight penetration its anaesthetic and disinfectant properties render it very useful.

Carbolic may also be used to destroy the dentinal fibrils in a sensitive cavity, and thus act as an obtundent. It should be applied pure and driven off with hot air. It does not penetrate deeply.

The caustic action of carbolic acid is also to be remembered when employing the drug for other purposes in full strength, and care taken to avoid touching the lips or gums with it. In the event of such an accident the part should be at once rubbed with *glycerine* or *oil*.

## COUNTER-IRRITANTS.

An irritant is called a counter-irritant when it is applied to the skin, or mucous membrane, with the object of altering the size of vessels of subjacent viscera.

Thermal, mechanical, or chemical stimuli may be made use of as counter-irritants.

Counter-irritants of various degrees of severity are made use of in dentistry :—

1. Hot fomentations, slices of hot boiled fig, a hot boiled raisin, or scarification.
2. Capsicum plasters.
3. Iodine, or mustard.
4. Iodine and scarification.
5. The actual cautery.

The last is so severe, and the wound so slow to heal, that it probably does more harm than good.

Counter-irritants are supposed to act :—

1. By dilating the cutaneous blood-vessels, and so relieving the blood pressure in the tissues immediately below.

**Example.**—A poultice, fomentation, or hot mouth-wash.

2. By stimulating the nerves, and so causing a reflex contraction of the vessels supplying the parts below.

**Example.**—Capsicum.

The application of cold over the root of a tooth suffering from periostitis will cause direct contraction



of the superficial and reflex contraction of the deep vessels, and so give temporary relief. The application of a warm poultice to the side of the face will cause dilatation of the cutaneous vessels (facial artery), and drain off some of the blood from an inflamed tooth; or it may, if very large, cause dilatation of the external carotid artery, and thus increase the flow of blood to both superficial and deep vessels.

The application of heat as a counter-irritant within the mouth must be nicely graduated and carefully placed, or it may increase rather than relieve the subjacent congestion.

Massage to the surface will stimulate an increased blood-flow in a part and in the parts in immediate connection with it.

Scarification, lancing, and the application of leeches will deprive the parts of blood, and relieve congestion in their immediate neighbourhood.

### **Capsicum. CAYENNE PEPPER.**

#### **Materia Medica.**

*Source.* The dried fruit of capsicum minimum.

*Preparations.* *Tinctura capsici* (5%).

*Dose.* 5 to 60 mins.

#### **Pharmacology.**

Has a powerful stimulant action similar to that of the volatile oils, but more superficial and prolonged.

#### **Therapeutics.**

Capsicum in the form of a plaster is often used for its counter-irritant effect as an application over inflamed roots. It is milder but less efficacious than iodine, and the plasters may be entrusted to the patient for use when required.

**Iodum.** IODINE, I.**Materia Medica.***Solubility.*

1 in 7000 of water,  
1 „ 12 „ alcohol,  
1 „ 65 „ glycerine,  
but freely soluble in solutions of potassium iodide.

*Preparations.*

**Liquor Iodi Fortis** (B.P. 12%). Not given internally. (The old Liniment.)

**Tinctura Iodi.** (U.S.P. 7%) Dose. 1 to 5 mins.

**Liquor Iodi Compositus.** (U.S.P. 5%)  
(Lugol's solution.) Dose. 1 to 10 mins.

**Tinctura Iodi.** (B.P. 2½%) Dose. 2 to 5 mins.

**Pharmacology.**

IRRITANT, ANTISEPTIC, DISINFECTANT, ACCELERATOR OF TISSUE CHANGES.

IRRITANT. Iodine is volatile and therefore penetrates well. It precipitates proteids, and enters into loose chemical combination with them. It therefore remains for a long time; hence its action is both deep and lasting, but is comparatively mild in quality.

ANTISEPTIC AND DISINFECTANT. See p. 71.

ACCELERATOR OF TISSUE CHANGES. See p. 156.

**Therapeutics.**

IRRITANT. As a counter-irritant a mixture of equal parts of the **Liquor Iodi Fortis** and **Fleming's Tincture of Aconite** is used. As an



application in cases of periostitis it frequently has a good effect, which may be attributed to :—

1. Its causing a superficial inflammation.
2. Some of the iodine penetrating deeper and causing absorption of inflammatory products.
3. The disinfectant action of the drug around the neck of the tooth.

When applying the drug, the gum should be first dried. Then, with a piece of cotton-wool wrapped round a wooden match, the gum over all the root should be painted with the mixture till stained brown; then let the patient rinse his mouth before swallowing. If used undiluted and too often, vesication will take place, and the inflammation may penetrate too deeply and increase the trouble.

*Liquor Iodi Fortis* is sometimes used to destroy the linings of cysts when their complete removal surgically is not convenient.

Iodine stains the skin and linen, and it or its vapour will destroy steel instruments.

Iodine stains may be removed from the fingers by ammonia solutions.

### Toxicology.

10 grs. of iodine have killed a man.

#### *Symptoms of poisoning.*

Burning pain in mouth, throat, and stomach.

Vomiting (brown), diarrhœa.

Thirst, headache, faintness.

Collapse.

#### *Treatment.*

An emetic of warm water, stomach-pump.

Starch (flour, potato).

## ASTRINGENTS, LOCAL STIMULANTS, AND MUMMIFYING AGENTS.

**Astringents** (*astringo*, I draw together) are substances which contract the tissues of the body.

From a therapeutic standpoint astringents may be divided into those used internally and those used externally. The former include means which check secretion in the alimentary canal (gastric and intestinal astringents) by their direct action on the mucous membrane and blood vessels. Those employed externally and in the mouth are alone dealt with here, and only in connection with their local action.

**Local stimulants** are substances, or means, which, applied locally, increase the activity of the cells.

**Mummifying agents** are substances which tend to dry, harden, and render tissues less liable to putrefaction.

ASTRINGENTS act by precipitating and coagulating proteids quickly, and in such a form that the coagulum is practically impermeable to the precipitant. They lessen the typical process of inflammation (congestion and increased permeability of the capillary walls) and hasten the absorption of effusions. This is done by coagulating the proteids and thus, by either forming an extra coat to the capillaries, or more probably, hardening the cement substance between the endothelial cells, preventing exudation. The absorption of effusions is probably caused by precipitating their proteid elements and thus increasing their fluidity and rate of osmosis. A contraction accompanies the coagulation of tissues, and some astringents



also stimulate the muscular tissue in the vessel walls, both actions tending to reduce the size of the blood vessels.

From their coagulating action it follows that astringents are only modified caustics, and this fact makes them of little use in acute inflammation, when they may lead to necrosis rather than to healing.

Applied to mucous membranes astringents limit secretion as well as exudation.

**LOCAL STIMULANTS** are again modified caustics ; the irritation of the cells being kept within physiological limits results in an increased activity of the cells, and not their destruction. Both astringents and caustics in appropriate solutions and concentration may act as stimulants.

**Massage**, by pressing out the stagnant fluids and semifluids of a part, by aiding the circulation of blood and lymph, and by gentle mechanical irritation, increases the nutrition and activity of the cells, and so is a local stimulant.

Local stimulants are of use to hasten the process of absorption after the extraction of teeth, in which case massage appears to be the most potent. For hastening the growth of granulations and the exfoliation of dead tissues in cases of pyorrhoea alveolaris and empyema antri, a change of drug occasionally seems to be more beneficial than always using the same.

**MUMMIFYING AGENTS** are a mixed group, and act in various ways, as by drying the part, coagulating and hardening the tissues, or permeating it with an antiseptic. The object being to so alter the tissue as to render it unfavourable to the growth of germs, and less likely to undergo putrefaction.

The total removal of the pulp, and its replacement with an aseptic non-absorbent root filling, is the best form of treatment for dead teeth ; but where this is impossible mummifying agents offer the greatest probability of permanent success. There is not yet enough evidence to say which of them is the best.



**Cupri Sulphas.** COPPER SULPHATE.  $\text{CuSO}_4, 5 \text{H}_2\text{O}$ .**Materia Medica.**

*Synonyms.* Blue stone, blue vitriol.

*Dose.*

$\frac{1}{4}$  to 2 grs. as a tonic.

5 to 10 grs. as an emetic.

*Characters.* Deep blue crystals, with a strong styptic, metallic taste.

*Solubility.*

1 in  $3\frac{1}{2}$  of water.

Almost insoluble in alcohol.

1 in  $2\frac{1}{2}$  of glycerine.

*Incompatibles.* Alkalies and their carbonates, iodides, most vegetable astringents, steel instruments.

**Pharmacology.**

ASTRINGENT, STIMULANT, ANTISEPTIC, DISINFECTANT, CAUSTIC, EMETIC, TONIC, MUMMIFYING AGENT (?).

ANTIPHLOGISTIC. (*ἄντι, φλογίζω*, I burn.) Drugs or means which allay inflammation.

The ASTRINGENT, STIMULANT, and ANTISEPTIC properties of the metallic salts are all due to the same action, and when not too violent they tend to reduce inflammation.

It is here proposed to treat of them all together under the heading of antiphlogistic, taking copper sulphate as a type.

*Copper sulphate* in solutions of 2 to 5 grs. to the ounce, applied to a mucous membrane or ulcer, precipitates the proteids of the exudation, and some of the copper unites with them to form albuminates. This produces a protective film of material unfavourable to the growth of germs. The blood vessels are acted upon in the same way, which renders them less permeable, and so limits exudation. The superficial



cells are coagulated and contracted, whilst the deeper cells, being reached only by a more dilute portion of the solution, are irritated and stimulated to greater activity. The germs are acted upon, as are the superficial cells, and coagulated, whilst the medium in which they live is at the same time rendered very unfavourable for their growth. The fluid portion of the exudate, being freed from its proteids, becomes more diffusible and is quickly absorbed. The coagulum, being insoluble, prevents deep penetration of the copper sulphate.

**DISINFECTANT.** In 5% solutions copper sulphate destroys germs.

**CAUSTIC.** In the solid form copper sulphate is a caustic, similar in action to the other metallic salts (see p. 19), but is milder than either zinc chloride or silver nitrate.

**EMETIC.** Copper sulphate in large doses (5 to 10 grs.) is an irritant to the mucous membrane of the stomach, and thus acts as a direct emetic.

**TONIC.** No use is made of this action by the dentist.

### Therapeutics.

**ANTIPHLOGISTIC.** (*Astringent, stimulant, antiseptic.*) Solutions of copper sulphate, 2 to 5 grs. to the ounce, are employed as mouth-washes and lotions for washing out the antrum in cases of chronic inflammation, and but for their unpleasant taste would be very useful.

Rx.

<i>Cupri Sulphatis</i>	gr. xxx.
<i>Glycerini</i>	3 j.
<i>Aquam Rosae</i>	ad 5 ij.

Misce. Fiat collutorium.

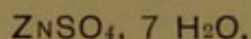
Signa. The mouth-wash.

To be mixed with an equal quantity of water, and held in the mouth as long as possible.

**DISINFECTANT, STIMULANT, ANTISEPTIC.** The most common use for copper sulphate is in the treatment of *pyorrhoea alveolaris*. The crystals are packed into the sockets with thin splinters of wood, after the removal of all tartar. Being but slightly soluble it will remain in place for some time, and after its initial caustic and disinfectant action will continue to exert a beneficial astringent, stimulant, and antiseptic influence. If the teeth have been properly cleansed the staining is very slight.

**MUMMIFYING AGENT.** On account of its coagulating and disinfectant action, copper sulphate has been recommended as an application to dead, or partially dead, nerves, as a preservative; but, thus shut in under a filling, copper sulphate in time permeates the dentine and produces very bad staining of the tooth. Its action is slow but effectual.

### **Zinci Sulphas. SULPHATE OF ZINC.**



#### **Materia Medica.**

*Synonym.* White vitriol.

#### *Dose.*

1 to 3 grs. as a tonic.

10 to 30 grs. as an emetic.

#### *Solubility.*

10 in 7 of water.

Insoluble in alcohol.

*Incompatibles.* Alkalies and their carbonates, lime water, tannin.



## Pharmacology.

## ASTRINGENT, STIMULANT, ANTISEPTIC, EMETIC.

ASTRINGENT, STIMULANT, ANTISEPTIC. Zinc sulphate is similar to, but milder in its action than, copper sulphate. It does not stain, and has a less unpleasant taste.

EMETIC. Being an irritant to the mucous membrane of the stomach, in large doses (10 to 30 grs.) it acts as a direct emetic.

## Therapeutics.

ANTIPHLOGISTIC. (*Astringent, stimulant, antiseptic.*) A solution of 8 grs. to the ounce forms a useful lotion for chronically inflamed antra or as a mouth-wash.

R.

*Zinci Sulphatis*                     $\bar{3} j.$   
*Aquam Cinnamomi*            $\bar{3} ij.$

Misce. Fiat lotio.

Signa. The lotion.

To be diluted with an equal quantity of water.

R.

*Zinci Sulphatis*                     $\bar{3} j.$   
*Glycerini*                            $\bar{3} ij.$   
*Aquam Rosae*                    *ad*  $\bar{3} ij.$

Misce. Fiat collutorium.

Signa. The mouth-wash.

To be diluted with an equal quantity of water.

## Alumen.

POTASH ALUM.  $AL_2(SO_4)_3, K_2 SO_4, 24H_2 O;$

AMMONIUM ALUM.  $AL_2(SO_4)_3, (NH_4)_2 SO_4, 24H_2 O.$

## Materia Medica.

*Dose.* 10 to 20 grs.

*Characters.* Colourless crystals, with an acid, sweetish, astringent taste. Solutions are acid in reaction from impurities.

*Solubility.* 1 in 11 of cold water. (3 in 1 of hot.)  
Insoluble in alcohol.  
1 in 3 of glycerine.

*Incompatibles.* Alkalies, lime, lead, tannic acid, mercury, salt.

*Preparations.*

*Alumen Exsiccatum*, dehydrated potash alum.

*Glycerinum Aluminis* (1 in 7).

### Pharmacology.

ASTRINGENT, CAUSTIC, STYPTIC, EMETIC,  
ANTISEPTIC, HASTENS THE SETTING OF PLASTER.

ASTRINGENT. Alum has a similar action to the other metallic salts, but the precipitate formed is slowly soluble in excess of proteid.

CAUSTIC. *Alumen Exsiccatum* rapidly absorbs water from the tissues as well as precipitating the proteids. It is a mild caustic.

STYPTIC. See p. 52.

EMETIC. Alum in large doses (60 grs. mixed with syrup) irritates the stomach and is a direct emetic.

ANTISEPTIC. Alum is an antiseptic 1 in 200.

EFFECT ON PLASTER. Alum hastens the setting, prevents the expansion, and permanently hardens plaster casts; by what means is unknown.

### Therapeutics.

ASTRINGENT. Solutions of alum 10 grs. to the ounce, or the *Glycerinum Aluminis*, are effective



astringent applications for chronic inflammatory conditions of the throat and mouth. The acid reaction of alum solutions prohibits its frequent use as a mouth-wash when there are teeth standing.

R.

<i>Aluminis</i>	3 j.
<i>Zinci Sulphatis</i>	3 ss.
<i>Sodii Boratis</i>	gr. iv.
<i>Aquae Rosae</i>	3 viij.

Misce. Fiat collutorium.

Signa. The mouth-wash.

To be used as directed.

Only to be prescribed for edentulous cases.

CAUSTIC. Not used in dentistry.

STYPTIC. See p. 52.

### **Argenti Nitras.** See p. 20.

#### Pharmacology and Therapeutics.

CAUSTIC, ASTRINGENT, STIMULANT, ANTISEPTIC,  
DISINFECTANT, STYPTIC.

ASTRINGENT, STIMULANT AND ANTISEPTIC.  
Weak solutions, 1 to 5 grs. to the ounce, of nitrate of silver have their caustic action so reduced as to become astringent and stimulant, but their taste and staining effect prohibit their use in the mouth.

### **Zinci Chloridum.** See p. 18.

#### Pharmacology and Therapeutics.

CAUSTIC, ASTRINGENT, STIMULANT, ANTISEPTIC,  
DISINFECTANT.

ASTRINGENT, STIMULANT, AND ANTISEPTIC.  
Weak solutions, 6 grs. to the ounce, are astringent

and stimulant. Their action is more vigorous than the sulphate, in part due to their greater solubility.

R.

<i>Zinci Chloridi</i>	gr. <i>vj.</i>
<i>Zinci Sulphatis</i>	gr. <i>viii.</i>
<i>Morphinae Sulphatis</i>	gr. <i>ij.</i>
<i>Aquae</i>	$\frac{z}{3}$ <i>viii.</i>

Misce. Fiat collutorium.

Signa. The mouth-wash.

To be diluted with an equal quantity of water.

### Potassii Permanganas. See p. 68.

#### Pharmacology.

CAUSTIC, ASTRINGENT, ANTISEPTIC, DISINFECTANT,  
DEODORANT.

ASTRINGENT. Weak solutions, 8 grs. to the pint,  
are astringent and deodorant.

#### Therapeutics.

ASTRINGENT. Permanganate of potash is never  
used solely for its astringent properties, as its staining  
action and taste are objectionable.

### Acidum Sulphuricum Aromaticum.

AROMATIC SULPHURIC ACID.

#### Materia Medica.

*Composition.* Sulphuric acid, spirit, spirit of cinnamon and  
strong tincture of ginger, and contains :—

(13·8 % of sulphuric acid B.P.)	
(20 %                    „                    „                    U.S.P.)	

*Dose.* 5 to 20 mins.



**Pharmacology.**

ASTRINGENT, STIMULANT, ANTISEPTIC, DECALCIFYING AGENT.

ASTRINGENT, STIMULANT, ANTISEPTIC. Weak solutions of acids act very similarly to the metallic salts, producing a coagulum which they are unable to penetrate; also they set up diffusion currents which alter the molecular structure of the cells. The alcohol and aromatic bodies in this particular preparation will add to its general effect.

DECALCIFYING AGENT. The aromatic acid soon dissolves tartar and fragments of dead bone; it also quickly damages enamel.

**Therapeutics.**

On account of all these actions, *Aromatic Sulphuric Acid* is used in the treatment of pyorrhoea alveolaris to help cleanse the pockets and stimulate the tissues. Great care is, however, necessary to protect the enamel, and it can only be advisedly used when the gum has much receded.

**Myrrha. MYRRH.****Materia Medica.**

*Dose.* 10 to 30 grs.

*Source.* A gum resin obtained from the stem of *Balsamodendron Myrrha*.

*Composition.* It contains a gum (60 %), a volatile oil, and a resin.

**Preparations.**

*Tinctura Myrrhae* (20 %) Dose.  $\frac{1}{2}$  to 1 dr.

## Pharmacology.

STIMULANT, ANTISEPTIC, SIALAGOGUE.

STIMULANT. Myrrh owes its stimulant action to the volatile oils and resins which it contains, and which act principally by their volatility and irritant action on the nerves. The gum tends to modify the action.

ANTISEPTIC. Also due to the volatile oil.

SIALAGOGUE. Myrrh is sialagogue from its aromatic taste.

## Therapeutics.

*Tincture of Myrrh*, diluted about eight times with water, is a useful, pleasant, and astringent STIMULANT to the gums, with an aromatic taste and slight antiseptic action; applied on pledgets of wool between and around the teeth after scaling, or removing soft masses of tartar, it produces a beneficial effect upon the inflamed gums.

As a mouth-wash.

R.

<i>Tincturae Myrrhae</i>	3 j.
<i>Thymol</i>	gr. j.
<i>Aquam Chloroformi</i>	ad 3 iv.

Misce. Fiat collutorium.

Signa. The mouth-wash.

To be diluted with an equal quantity of water.

## Pyrethri Radix. See p. 107.

## Pharmacology.

STIMULANT, SIALAGOGUE, LOCAL ANÆSTHETIC.

STIMULANT AND LOCAL ANÆSTHETIC. Pellitory root derives its stimulant action from the volatile oils and resins it contains, and from the presence of a body allied to piperine, all of which



are volatile stimulants which penetrate well. They eventually depress sensation by over-stimulation of the nerves.

### Therapeutics.

*Tincture of Pyrethrum*, diluted about eight times with water, forms a pleasant STIMULANT application to inflamed gums, similar to but more powerful in its action than myrrh.

R.

<i>Acidi Tannici</i>	gr. xx.
<i>Tincturae Pyrethri</i>	5 iij.
<i>Aquam Rosae</i>	ad 5 ij.

Misce. Fiat collutorium.

Signa. The astringent mouth-wash.

To be used as directed.

### Alcohol. See p. 147.

### Pharmacology.

STIMULANT, ASTRINGENT, LOCAL STIMULANT,  
SOLVENT.

LOCAL STIMULANT. Alcohol, by its affinity for water and solvent action on certain constituents of the cells, causes a stimulation, and later on a depression of activity.

### Therapeutics.

Alcohol is used as a solvent for other stimulants, as in the tinctures, in order to increase their action, and itself acts as a STIMULANT.

### Chlorum. CHLORINE, CL.

### Materia Medica.

Dose. Not given pure.

*Preparations.**Aqua Chlorig* (U.S.P.) 0.4% Cl.

Dose (dilute). 1 to 5 drs.

*Calx Chlorinata* (B.P. & U.S.P.) 35% Cl.

Dose. 3 to 6 grs.

*Liquor Sodæ Chlorinatæ* (B.P. & U.S.P.) 2½% Cl.

(Labarraque's Solution.) Dose. 10 to 20 mins.

*Liquor Calcis Chlorinatæ* (B.P.) 2% Cl.

## Pharmacology.

CAUSTIC, STIMULANT, DISINFECTANT, ANTI-SEPTIC, BLEACHING AGENT.

CAUSTIC. Not used.

STIMULANT. Chlorine penetrates rapidly, and enters into loose combination with the cells, precipitates proteids, and stimulates tissues.

DISINFECTANT AND ANTISEPTIC. See p. 74.

BLEACHING AGENT. See p. 126.

## Therapeutics.

STIMULANT, ANTISEPTIC. Weak solutions of chlorine are employed as stimulating disinfectant lotions in sloughing conditions and membranous inflammation of the mouth, on account of their penetrating power.

R.

<i>Liquor Calcis Chlorinatæ</i>	3	<i>ij.</i>
<i>Aquam</i>	<i>ad</i>	O. <i>j.</i>

Misce. Fiat collutorium.

Signa. The stimulant disinfectant mouth-wash.

To be used as directed.



**Acidum Tannicum.** TANNIC ACID.  $C_{14}H_{10}O_9$ .**Materia Medica.**

*Synonyms.* Digallic anhydride, tannin.

*Dose.* 2 to 10 grs. or more.

*Solubility.*

10 in 8 of water or alcohol.

1 in 3 of glycerine.

*Incompatibles.* Gelatine, mineral acids, alkalies, salts of lead, salts of silver, per-salts of iron, most alkaloids, vegetable emulsions.

*Preparations.* *Glycerinum Acidi Tannici.* 1 in 5.

**Pharmacology.**

ASTRINGENT, STYPTIC, ANTISEPTIC, MUMMIFYING AGENT.

ASTRINGENT. Tannin acts by precipitating proteids, connective tissues and gelatine; thus limiting exudation and passively constricting the blood-vessels. Its direct action on the blood-vessels is to dilate them, but the indirect action is far the stronger.

MUMMIFYING AGENT. Tannin is used as a mummifying agent because it combines with the tissues to form an insoluble tannate, causing them to shrink and become harder and less fermentable, and in time considerably alters them.

Leather is tanned skin and very little liable to fermentation, but it is not possible to so thoroughly incorporate the tannin with the pulp as it is in skin, nor is pulp as firm and unfermentable as skin.

**Therapeutics.**

ASTRINGENT. Solutions of tannin, 5 to 8 grs. to the ounce, are often used as astringents to allay

chronic inflammation of the mucous membrane of the mouth or throat. To hasten the resolution of the swelling caused by a regulation plate, after easing the plate, paint the dried gum with the *Glycerinum Acidi Tannici*.

As a lotion :—

R.

<i>Acidi Tannici</i>	$\frac{7}{3}$ ss.
<i>Eau de Cologne</i>	$\frac{7}{3}$ iv.

Misce.

Signa. The concentrated mouth-wash.

Add 10 to 12 drops to a teaspoonful of warm water and use as a mouth-wash three or four times a day.

MUMMIFYING AGENT. The tannin must be applied in the form of a solution in order to penetrate the pulp tissue; even then it is doubtful how far it will go in the face of the barrier of insoluble tannate it itself forms. Absolute alcohol, glycerine, carbolic acid, and Listerine have been proposed as solvents. It is almost necessary that the pulp shall be in an aseptic condition to start with.

**Hamamelis.** See p. 53.

Pharmacology.

ASTRINGENT, STYPTIC.

ASTRINGENT. Hamamelis owes its astringent properties to the tannin it contains. Different plants contain different forms of tannin, which often differ in activity.

Therapeutics.

ASTRINGENT. *Liquor Hamamelidis* and "*Hazeline*," diluted with two or three volumes of water, are favourite preparations as astringent lotions for use in the mouth after extraction of several teeth,



on account of their pleasant taste and sedative effect ; the drug seems to act more powerfully than the quantity of tannin in it would warrant.

## **Krameria Radix.** RHATANY ROOT.

### **Materia Medica.**

*Source.* The dried root of Para or Peruvian rhatany.

*Incompatibles.* Same as for tannin.

*Preparations.*

*Tinctura Krameria* (20 %). Dose.  $\frac{1}{2}$  to 1 drm.

### **Pharmacology.**

ASTRINGENT, COLOURING AGENT.

ASTRINGENT. *Krameria* contains from 20 to 45 % of tannin, to which its actions are due.

COLOURING AGENT. See p. 111.

### **Therapeutics.**

*Tincture of Krameria* is used as much for its fine red colour and pleasant odour as for its astringent properties in mouth-washes.

#### *Take of*

*Tincture of Krameria*

*Boroglyceride*

*Eau de Cologne*

*Spirit of Chloroform*      of each      4 drms.

*Rectified Spirit*              up to      4 ounces.

**Mix.** Let a mouth-wash be made.

**Label.** The mouth-wash.

One teaspoonful to be mixed with a wineglassful of water, and held in the mouth as long as possible.

**Formic Aldehyde.** See p. 79. Non-official.

## Pharmacology.

ANTISEPTIC, DISINFECTANT, DEODORANT,  
CAUSTIC.

## Therapeutics.

MUMMIFYING AGENT. *Formaline* is a 40 % solution of *Formic Aldehyde*, and has the power of very rapidly and deeply penetrating animal tissues, and of coagulating and hardening the cells and matrix without causing shrinking. It is also a powerful disinfectant. A 5 % solution of *Formic Aldehyde* has therefore been used for hardening and preserving the pulp *in situ*. Its disadvantage is that it has a powerful and lasting irritant action. The vapour from the solution is very irritating to the conjunctiva and nasal mucous membrane.

**Hydronaphthol.** See p. 78. Non-official.

## Pharmacology.

ANTISEPTIC, DISINFECTANT.

## Therapeutics.

MUMMIFYING AGENT. After a tooth has been thoroughly dehydrated an alcoholic solution of hydronaphthol may be made to penetrate very deeply and to disinfect as it goes. It is not so irritant as formaline, but moisture prevents its penetration.

**Arsenic and Carbolic Acid**

should not be used as mummifying agents ; the first because it will probably penetrate beyond the dentine and destroy the periodontal membrane, and so loosen the tooth ; and carbolic acid because it is volatile and will soon evaporate and leave the pulp unprotected.



## STYPTICS, HÆMOSTATICS.

**Styptics** (στυφω, I contract, draw together) and

**Hæmostatics** (αἷμα, blood, ἵστημι, I stop, check) are agents which control or avert hæmorrhage.

They all act by imitating or assisting natural processes, and may stop bleeding:—

1. By acting on the **blood**, favouring coagulation, or solidifying the albuminous constituents, and thus plugging the bleeding points.
2. By promoting contraction of the wall of the ruptured **vessels**. Active astringents.
3. By acting on the **perivascular tissues**, and coagulating and constricting their protoplasm, so that the torn vessels are compressed or closed. Passive astringents.

The means used in dentistry comprise:—

### 1. Heat and Cold.

These act by causing contraction of involuntary muscular fibre in the vessel walls, and their consequent closure allowing the formation of a clot. Heat is the more efficacious as acting more rapidly, and successive applications do not exhaust the muscular fibre, as is the case with cold.

Hot or cold water is of great use in checking hæmorrhage due to operations in the mouth, particularly that arising from tooth extraction.

Hot water must be used quite hot, *i.e.*, at a temperature at which it is only just possible to bear the finger in it. Cold water as cold as possible. "Luke-warm" temperatures and those about blood-heat are likely to keep up the bleeding.

In the case of hæmorrhage from tissues previously acutely inflamed cold is best avoided as likely to depress an already lowered vitality.

Heat applied in the form of the actual cautery is a powerful hæmostatic. The bleeding point or surface is blocked by the formation of a thick slough or eschar; on the separation of which, however, secondary hæmorrhage is not unlikely to occur. A dull red or black heat is the best to employ.

The actual cautery is of service to the surgeon in major operations about the mouth (such as removal of the jaw), but has only a theoretical interest for the dentist.

## 2. Drugs.

These may act in any of the ways described above, and are employed :—

1. As local applications to the seat of hæmorrhage.
2. As medicines administered internally, or by hypodermic injection, which favour coagulation of the blood, or constrict the vessels generally.

The use of heat, cold, or surgical measures is *always to be preferred* to that of styptic drugs where the seat of hæmorrhage is accessible; and when employed the latter are to be regarded as auxiliaries only, and not made use of exclusively.

Except that local styptic applications may be used, and are frequently of service to the dentist, in quite trivial bleeding.

**Example.**—Oozing from a gum accidentally lacerated by an instrument into a cavity it is desired to excavate or fill; though even here other means (such as application of the rubber dam) are to be preferred, if available.



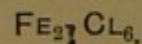
The great objection to the use of powerfully astringent drugs (such as iron salts and silver nitrate) as local hæmostatics is that they frequently cause inflammation and sloughing of the tissues. Secondary hæmorrhage sometimes occurs on the separation of the slough, though this is less likely to occur if the part be kept aseptic. Hence the use of such agents, except as a last resort, is to be avoided.

In applying a styptic drug for the arrest of hæmorrhage after tooth extraction, it is necessary first of all to remove clot and *débris* from the socket, which can be effected by syringing or mopping. (When once the bleeding has ceased the clot must, of course, not be interfered with.) Then wipe the socket as dry as possible, so as to ascertain from which part the bleeding proceeds, and, in the case of multiple-rooted teeth, from the alveolus of which root; then quickly, before the blood collects again, apply the drug on a pledget of cotton-wool or lint, taking care that it comes in contact with the bleeding point. Leave the wool in place, and over this place pieces of rolled lint, so as, if possible, to obtain pressure from opposing teeth when the jaws are closed, or secure by ligature to neighbouring teeth. Bandaging the jaws together may be necessary in the case of young patients. Instruct the patient to avoid lying down, or taking stimulants or warm food or drink.

Internal hæmostatic medicines may be administered at the same time.

Remove the plug within twenty-four hours, or decomposition and consequent septic infection may result.

### **Ferri Perchloridum.** PERCHLORIDE OF IRON.



#### **Materia Medica.**

##### *Incompatibles.*

All preparations containing tannic or gallic acids, alkalies and their carbonates, magnesia, chalk.

*Preparations.*

*Liquor Ferri Perchloridi Fortis.*

Not given internally.

*Liquor Ferri Perchloridi.*

Strong solution 1. Water 3. Dose. 5 to 15 mins.

*Tinctura Ferri Perchloridi.*

Strong solution 1. Alcohol 1. Water 2.

Dose. 5 to 15 mins.

*Pharmacology.*

STYPTIC, ASTRINGENT, CAUSTIC, HÆMATINIC,  
AND TONIC.

The styptic action of perchloride of iron may be taken as typical of that of all the **Ferric Salts** (per-salts). It is the one most generally employed.

STYPTIC. Applied to a bleeding surface, this drug quickly causes coagulation of the blood and consequent plugging of the bleeding vessels. The albuminous fluids in the tissues are also coagulated, and the contraction set up around the vessels compresses them and diminishes their calibre. There is probably no direct effect on the vessel walls.

TONIC. See page 140.

CAUSTIC. Not used for this purpose.

ASTRINGENT. Not used in dentistry for this purpose.

*Therapeutics.*

STYPTIC. *Per-salts of Iron* are the most powerful local hæmostatics that we possess, but it is better never to employ them in any strength except as a last



resort, on account of their tendency to cause sloughing and secondary hæmorrhage.

**Styptic wool**, or cotton wool saturated with a weak *solution of Perchloride of Iron*, is sometimes usefully employed to check quite trivial hæmorrhage from the gums when this is interfering with an operation on a tooth.

**Sulphate of Iron** (a ferrous salt) is a useful STYPTIC, and one having less escharotic action than the iron per-salts. It may be applied to the spot in the form of the dried powder (*Ferri Sulphas Exsiccata*).

**Argenti Nitras.** See p. 20.

#### Pharmacology and Therapeutics.

HÆMOSTATIC. Has a styptic action similar to that of perchloride of iron, save that in addition it causes active contraction of the blood-vessels. May be employed as the powdered drug or in a 10 % solution to check bleeding, but owing to its powerfully caustic action should be used with caution. See p. 21.

**Alumen.** See p. 36.

#### Pharmacology and Therapeutics.

ASTRINGENT, STYPTIC, ANTISEPTIC, EMETIC.

STYPTIC. Coagulates blood and albumen in the tissues (see Perchloride of Iron), thus acting as a local hæmostatic. Is less objectionable for this purpose than per-salts of iron and nitrate of silver, as it is not nearly so caustic. Its action is, however, not so powerful in checking hæmorrhage. For alveolar bleeding is best used as the powder applied to the socket on wool or lint.

**Acidum Tannicum.** See p. 44.

**Pharmacology.**

STYPTIC, ASTRINGENT, ANTISEPTIC, SLIGHTLY  
DISINFECTANT.

STYPTIC. Tannic acid dilates the blood-vessels, but used as a local hæmostatic this property is more than counterbalanced by its power of condensing or "tanning" the tissues by precipitating their albuminous constituents (thus acting as a constringent) and of coagulating the blood.

**Therapeutics.**

STYPTIC. Tannic acid has some disinfectant action, and is less likely to cause sloughing than persalts of iron, and on this account is to be preferred to these for the arrest of hæmorrhage. It is used in the form of the powder applied by insufflation or on wool.

**Hamamelis.**

**Materia Medica.**

*Synonym.* Witch hazel.

*Source.* The dried bark and leaves of *Hamamelis virginica*.

*Incompatibles.* As for tannic acid. See p. 44.

*Preparations.*

*Extractum Hamamelidis Liquidum.*

Dose. 5 to 15 mins.

*Hazeline* (a specialty ; not official).

Dose.  $\frac{1}{2}$  to 3 drs.



**Pharmacology and Therapeutics.****HÆMOSTATIC, ASTRINGENT.**

**HÆMOSTATIC.** Hamamelis contains 8% of tannic acid, also a volatile principle not yet isolated. Its local hæmostatic action is doubtless due, in part at all events, to the presence of the former constituent. It is also reputed to have a remote hæmostatic action when given by the mouth, and may thus be employed for the hæmorrhagic diathesis.

The unofficial preparation "*Hazeline*" is considered by some to be more efficacious.

**ASTRINGENT.** See p. 45.

**Maticæ Folia.** MATICO LEAVES. No longer official.**Materia Medica.**

*Source.* The dried leaves of *Piper augustifolium*.

*Composition.* Contain a volatile oil, resin, and tannic acid.

**Pharmacology.****STYPTIC, AROMATIC.**

The LOCAL HÆMOSTATIC action is largely due to the structure of the leaf, which has numerous hairs on its under surface, with which the blood coming into contact, coagulation is favoured.

**Therapeutics.**

Occasionally used in dentistry to check alveolar hæmorrhage after extraction. The leaves should be cut into strips, rolled up with hairy side out, and placed in the socket, pressure being applied over all by means of wool or lint.

# **Oleum Terebinthinae.** OIL OF TURPENTINE.

## **Materia Medica.**

*Source.* The oil distilled from the oleo-resin (turpentine) obtained from various species of *Pinus*.

*Dose.* 2 to 10 mins.

*Solubility.* Does not mix with water unless previously emulsified, hence must be prescribed with some form of mucilage.

## **Pharmacology.**

**HÆMOSTATIC.** Administered internally turpentine contracts the vessels, and thus acts as a hæmostatic, but is not often used, as even in moderate doses turpentine may produce symptoms of irritation and congestion of the urinary organs, lumbar pain, difficulty of micturition, and even hæmaturia. Large doses may so affect the kidneys that suppression of urine results.

## **Therapeutics.**

In general medicine it is used for hæmorrhage from the lungs and intestines. It has been recommended by Mr. Shield as a **HÆMOSTATIC** for operations about the mouth, applied on sponges locally.

This drug may be prescribed as follows :—

R.

<i>Olei Terebinthinae</i>	℥	x.
<i>Mucilaginis Acaciae</i>	℥	ij.
<i>Aquam Carui</i>	ad	℥ j.

Misce. Fiat mistura. (For one dose.)

# **Hydrogenii Peroxidum.** See page 69.

## **Pharmacology and Therapeutics.**

**HÆMOSTATIC.** In addition to other actions, it has that of a marked local hæmostatic. How it acts



is not quite clear, but probably the effect is largely due to the mechanical action of the frothing caused by the liberation of the oxygen, agitation favouring coagulation. Is useful to the dentist in checking hæmorrhage from the gums during a dental operation, and used for this purpose is free from the objections which render astringent styptics undesirable.

**Calcii Chloridum.** CHLORIDE OF CALCIUM.  
 $\text{CaCl}_2$ .

**Materia Medica.**

*Solubility.* 1 in 1 of water.

*Characters.* Very deliquescent, white masses or crystals.

*Dose.* 5 to 15 grs.

**Pharmacology and Therapeutics.**

**HÆMOSTATIC.** Lime salts increase the rate of coagulation of the blood, and calcium chloride has consequently been administered internally in the treatment of hæmophilia and various forms of hæmorrhage.

*Calcium Sulphate* (plaster of Paris), a material always available to the dentist, has been known to check alveolar hæmorrhage on being applied to the bleeding socket, when all other means had failed.

**Ergota.** ERGOT.

**Materia Medica.**

*Synonym.* Ergot of rye.

*Source.* The sclerotium of a fungus (*Claviceps purpurea*) which grows on *Secale cereale*, or common rye.

*Dose.* 20 to 60 grs.

*Preparations.**Extractum Ergotae Liquidum.* 1 in 1.

Dose. 10 to 30 mins.

*Injectio Ergotae Hypodermica.*

Contains 33% of the extract. Dose. 3 to 10 mins.

**Pharmacology.**

Ergot has no external action. Administered by the mouth or by hypodermic injection, it causes contraction of unstriated muscular tissue in all parts of the body, and consequently has a powerful effect in arresting hæmorrhage from the intestines or uterus. From its action on the muscular coat of the vessel walls it is to a certain extent a GENERAL HÆMOSTATIC, and this effect is aided by a reduction in the frequency of the heart's action; but its efficiency is somewhat discounted by the fact that it causes a rise of blood-pressure.

**Therapeutics.**

Ergot is not to be relied on to any great extent in hæmorrhages from the mouth.

In cases of hæmophilia, or obstinate bleeding from any cause, the liquid extract may be used as follows:—

R.

*Extracti Ergotae Liquid* ʒ ii.*Acidi Sulphurici Diluti* m xl.*Aquam Menthae Piperitae* ad ʒ iv.

Misce. Fiat mistura.

Signa. Two tablespoonfuls every hour till the bleeding ceases.

Or the *hypodermic injection* may be used. This should be recently prepared; it should be injected into the muscles, and not, as is usual, under the skin, as it is sometimes irritating.

**Note.** Avoid the use of ergot if the patient be pregnant.



## Suprarenal Gland.

### Materia Medica.

The gland powdered and desiccated may be used.

*Dose.* 2 to 6 grs.

### Preparations.

*An aqueous extract* of any strength may be prepared from the gland substance.

A liquid preparation of the active principle of suprarenal gland, which is more stable than the aqueous extracts, is prepared by Parke, Davis & Co., and called—

*“Solution Adrenalin (Takamine) Chloride,”*  
1 in 1,000,

which may be used for local application or internally.

*Dose.* 5 to 30 mins.

Also a preparation called—

*“Suprarenal Liquid with Chloretone.”*

This is an aqueous solution, to which 0·8% of chloretone has been added; it may be used for subcutaneous injection, but does not keep so well.

*Dose.* 1 to 3 mins.

The active principle is destroyed by alkalies or prolonged boiling.

### Pharmacology.

#### HÆMOSTATIC, MUSCULAR STIMULANT.

**HÆMOSTATIC.** Suprarenal extract acts by direct stimulation of the muscular element of the vessel walls and heart, without producing any coagulation or caustic effect.

### Therapeutics.

**HÆMOSTATIC.** For arresting capillary hæmorrhage a **20%** solution of the gland substance may be applied to the part, with pressure, for a few minutes, when the vessels will contract and the hæmorrhage cease.

An aqueous extract, **20%**, may be injected into the tissues, or packed against them for a few minutes, before operating, when the bleeding will be very greatly reduced. This may prove of great use when extracting difficult and buried roots, or many teeth at one sitting.

The addition of **3 mins.** of a **20%** solution (sterilised) to 20 mins. of 4% eucaine solution for subcutaneous injection will increase the anæsthetic effect, reduce the liability to poisoning, and greatly lessen the hæmorrhage. By employing this mixture some degree of anæsthesia can be produced in inflamed tissues.

The pain arising from the pressure of inflammatory congestion can be temporarily mitigated by an injection of suprarenal extract.

Taken internally it also produces a general hæmostatic effect.

Its action in cases of hæmophilia is doubtful.

From the absence of any caustic effect, it is a drug that may be used freely as a local application, and, but for the instability of its solutions, would often prove useful for the arrest of slight hæmorrhages from the gum. A fresh watery extract will last two days.



## ANTISEPTICS, DISINFECTANTS AND DEODORANTS.

An Antiseptic is that which prevents or arrests the growth of micro-organisms (germs).

A Disinfectant is that which destroys micro-organisms.

A Deodorant is that which destroys foul odours.

The agents employed under this heading in dentistry comprise :—

### 1. Heat.

All pathogenic micro-organisms are destroyed by boiling for five minutes and non-spore bearing germs by a temperature of  $60^{\circ}\text{C}$ . for 10 minutes. Lower temperatures or for shorter times are not safe disinfectants. All instruments brought in contact with wounded vascular tissues, such as forceps, scalers, &c., should therefore be boiled before using on another patient. Any instrument brought in contact with a patient suffering from a specific infectious disease should be boiled.

It is not necessary to boil mirrors, excavators, burnishers, &c.; a thorough mechanical cleansing and the use of 1-20 carbolic acid being efficient and more convenient.

Such physical agents as cold, desiccation, electricity, pressure and agitation, as means capable of destroying or inhibiting the growth of germs, are of little practical use to the dentist, and are not dealt with in this book.

## 2. Drugs.

Germes are living vegetable organisms. In order to destroy them, or inhibit their growth, the disinfectants or antiseptics used must touch them for a definite time, and must be of a definite strength and unaltered.

The value of drugs as disinfectants or antiseptics will vary according to :—

1. The nature of the materials surrounding or associated with the germs.
2. The kind and condition of the germs.
3. The presence or absence of spores.
4. Temperature.
5. The number of germs present.
6. The length of time they are allowed to act.
7. The concentration of the drug.
8. The toxic and corrosive action of the agents.

Many germs have a gelatinous covering, and most germs are mixed up with *débris* of various kinds, so that **mechanical cleansing** is a great aid to disinfection. Also it is important for the drug to be able to **penetrate quickly** into the mass to be disinfected. A drug much diluted by saliva, blood, or pus may be too weak to be efficient. Some drugs are chemically altered by the media surrounding the germs, and become inert. **Example.**—Mercuric chloride is precipitated by albuminous fluids.

Many disinfectants are **caustic**, and all are more or less irritants; therefore, it is very necessary to be careful in their use. Healing may be arrested or tissues killed by the application of strong irritants, and thus a more favourable site for germ growth produced on the washing away or neutralisation of the drug. Healthy living tissues and fresh blood serum are inimical to the activity or vitality of micro-organisms.

The penetrating power of a disinfectant will depend upon :—

- (a.) The drug, its solubility, viscosity, diffusibility, and its chemical reaction with the tissues.



- (b.) The **solvent** used, its viscosity, diffusibility, its chemical reaction with the fluids of the part.
- (c.) The **material** to be penetrated, its density, chemical and physiological reaction, and surface tension towards the drug and solvent used. Also any preparatory treatment it may have undergone.
- (d) The **method of application**, the care with which contact is ensured, the exclusion of moisture or saliva, and the use of pressure or electricity.
- (e) The **time** during which the application lasts.
- (f) The **movements** of the tissues and the circulation of the fluids within them.

In selecting a disinfectant for any particular case all the above conditions must be thought of, and the most suitable drug, solvent, and concentration chosen.

For disinfectants for root-canals one must take into consideration their :—

1. Germicidal power.
2. Penetrating power.
3. Permanency of action.
4. Effect on instruments.
5. Smell.
6. Irritant action.
7. Solvent and the stability of solutions.
8. Liability to stain the tooth.

### Deodorants.

Bad odours may arise from the presence of evil-smelling bodies, such as stale tobacco and excretions from the mucous membrane, but is more often the result of putrefaction; hence disinfectants are also often used as deodorants. Drugs having a powerful

oxidising action are also much used as deodorants, the oxygen combining with the ill-smelling body to form a new odourless and usually less harmful substance.

Concealing one smell by another is not deodorising, and is bad practice. It should never be forgotten that **cleanliness** is the first and most essential step towards disinfection or deodorising.

**Hydrargyri Perchloridum.** PERCHLORIDE  
OF MERCURY.  $\text{HgCl}_2$ .

**Materia Medica.**

*Synonyms.* Corrosive sublimate, hydrargyrum chloridum corrosivum, bi-chloride of mercury.

*Dose.*  $\frac{1}{32}$  to  $\frac{1}{16}$  gr.

*Solubility.*

1 in 19 of water.

1 „ 5 „ alcohol.

1 „ 2 „ glycerine.

*Incompatibles.* Soap, alkalies, tannin, steel, albumin.

*Preparations.*

*Liquor Hydrargyri Perchloridi.* 1 in 875.

Dose.  $\frac{1}{2}$  to 1 dr.

*Sal Alembroth.*

Equal parts of mercuric and ammonium chlorides.

**Pharmacology.**

ANTISEPTIC, DISINFECTANT, CAUSTIC, ANTISYPHILITIC.

ANTISEPTIC AND DISINFECTANT. The metallic salts act as disinfectants by coagulating and combining with the protoplasm of the germs, as with that of



other cells, and hence their action will be greatly reduced in the presence of other proteids.

Mercuric salts have in addition a specific influence on germs, which is the chief cause of their efficiency. The perchloride is ANTISEPTIC in a strength of 1 in 15,000 and is DISINFECTANT 1 in 1,000. Albuminate of mercury is soluble in an excess of albumin, and is disinfectant.

CAUSTIC. Not used in dentistry.

ANTISYPHILITIC. See p. 157.

### Therapeutics.

ANTISEPTIC AND DISINFECTANT. The numerous incompatibles are the chief objections to the use of mercuric chloride. These objections may, to a certain extent, be overcome by adding an equal quantity of sodium, potassium, or ammonium chloride to the solution, as they render the salt less precipitable by albumin, more soluble, and less irritating. The combination with *Ammonium Chloride* is known as *Sal Alembroth*, and is used for dressings. Mercuric chloride acts quickly and in very dilute solutions, but penetrates poorly, and the nature of surrounding tissues must always be borne in mind. Its toxicity and evil taste are much against its use as a gargle, though a 1 in 2,500 solution is the quickest and most effectual disinfectant mouth-wash known. A 1 in 1,000 solution has been recommended for syringing out pyorrhoea pockets after proper previous cleansing (a platinum syringe must be used). For the treatment of root-canals, 1 in 500 is a powerful and lasting disinfectant, but easily precipitated and so prevented from penetrating. It is destructive to steel instruments, without smell, not liable to cause irritation, and sufficiently soluble. It is said to stain the tooth dark, but this is not liable to happen unless from the use of steel instruments or the presence of some other impurities.

As a mouth-wash—

R

*Liquoris Hydrargyri Perchloridi*  $\frac{3}{4}$  iss.

*Tincturae Calendulae*  $\frac{3}{4}$  iv.

*Aquam* ad.  $\frac{3}{4}$  iv.

Misce. Fiat collutorium.

Signa. The mouth-wash.

### Toxicology.

2 grs. have killed a man in half an hour.

### *Symptoms of poisoning.*

Strong metallic taste.

Constricting and burning pain in the throat and stomach.

Vomiting (white and slimy), purging, tenesmus.

Collapse.

### *Treatment.*

Give albumin (milk, white of egg).

Wash out the stomach.

Brandy and opium.

**Argenti Nitras.** See p. 20.

### Pharmacology and Therapeutics.

CAUSTIC, ASTRINGENT, ANTISEPTIC, DISINFECTANT.

ANTISEPTIC AND DISINFECTANT. Very weak solutions (1 in 12,000) are ANTISEPTIC, and the exposed roots of teeth which have been cauterised with silver nitrate appear to resist caries for a long time when kept clean. It acts in a similar manner to the other metallic salts. 1 in 2,000 is DISINFECTANT to most



germs. The staining action is the principal drawback to its use. It has been recommended, applied by means of pieces of blotting paper saturated with a 40 % solution, as a dressing under fillings, and in children's teeth may be of use, but the marked staining produced contra-indicates its employment for permanent teeth.

**Cupri Sulphas.** See p. 33.

Pharmacology and Therapeutics.

CAUSTIC, ASTRINGENT, STIMULANT, ANTISEPTIC,  
DISINFECTANT.

ANTISEPTIC AND DISINFECTANT. Copper sulphate is a very good astringent disinfectant, having a similar action to the other metallic salts. On account of its slight solubility it forms a lasting application for the disinfection of pyorrhoea pockets. The presence of albumin greatly reduces its power, but an 8% solution should be DISINFECTANT in the mouth, in the absence of spores, whilst a 1% solution is ANTISEPTIC. The stimulant and astringent actions are valuable aids in the treatment of stomatitis, and, but for its taste and staining action, it would be very popular.

For prescription see p. 34.

**Zinci Chloridum.** See p. 18.

Pharmacology and Therapeutics.

CAUSTIC, ASTRINGENT, STIMULANT, ANTISEPTIC,  
DISINFECTANT.

ASTRINGENT AND DISINFECTANT. Zinc chloride is a weak disinfectant; even in 5% solutions it sometimes fails to destroy germs after prolonged contact.

## ANTISEPTICS, DISINFECTANTS AND DEODORANTS. 67

Its antiseptic action is made use of in the form of the **Oxychloride cement**, which contains free zinc chloride, and may be used for filling roots, fixing crowns, or lining cavities, not in close proximity to a live nerve. Zinc chloride is antiseptic **1 in 500**.

For prescription see p. 39.

## **Acidum Boricum.** BORIC ACID, $H_3BO_3$ .

### **Materia Medica.**

*Synonym.* Boracic acid.

*Dose.* 5 to 15 grs.

*Solubility.*

1 in 30 of water,  
1 „ 28 „ alcohol,  
1 „ 4 „ glycerine.

*Preparations.*

***Glycerinum Acidi Borici*** (B.P.) 1-3½.

***Glyceritum Boroglycerini*** (U.S.P.) 31% boric acid.

***Boroglyceride*** (Barff). Non-official.

### **Pharmacology and Therapeutics.**

A saturated 4% solution of boracic acid is a mild ANTISEPTIC, with little irritant action, and is very useful for flushing out an inflamed antrum.

For prescription see p. 46.

The powder forms a useful antiseptic dusting powder.

## **Sodii Biboras.** BORAX. See p. 155.

Is an alkaline borate, with slightly greater antiseptic action than boric acid.

For prescription see pp. 38, 81, 87.



**Potassii Permanganas.** PERMANGANATE OF  
POTASH.  $\text{KMnO}_4$ .

**Materia Medica.**

*Dose.* 1 to 3 grs.

*Solubility.*

1 in 18 of water.

Decomposed by alcohol.

*Incompatibles.* Soap, organic bodies.

*Preparations.*

*Liquor Potassii Permanganatis*, 1 in 100.

*Dose.* 2 to 4 drs.

*Condy's Fluid.* 32 grs. to the pint. *Dose.* 5 mins.

**Pharmacology.**

CAUSTIC, ASTRINGENT, DEODORANT, ANTISEPTIC,  
DISINFECTANT.

CAUSTIC AND DISINFECTANT. Strong solutions of permanganate of potash, like all oxidising agents, act as caustics and disinfectants by the rapid liberation of oxygen when brought in contact with organic bodies, the oxygen at once combining with the tissues, germ protoplasm, or products to form simpler unorganised bodies.

ASTRINGENT, DEODORANT AND ANTISEPTIC. Weak solutions (1 in 1,000) are astringent, and, by oxidising the products of putrefaction, rapid and effective deodorants and weak antiseptics.

**Therapeutics.**

CAUSTIC. Not used in dentistry.

DISINFECTANT.—The burning and staining produced by strong solutions preclude their use in the

mouth. They may be used for disinfecting the hands, they being immediately afterwards bleached with *oxalic acid or sulphite of soda*.

ASTRINGENT, DEODORANT, ANTISEPTIC. The principal use of permanganate is as a deodorant, for which it is both rapid and effective in 0·1% solutions; the accompanying astringent and antiseptic actions are weak, but usually beneficial.

In hospital practice it is usual to direct the patient to buy a pennyworth of permanganate of potash and dissolve a crystal in enough water to form a claret-coloured solution. The patient should be warned not to touch the crystals with damp fingers.

Solutions quickly oxidise and become brown if exposed to the air and dust.

## Hydrogenii Peroxidum. PEROXIDE OF HYDROGEN. $H_2O_2$ .

### Materia Medica.

#### Preparations.

##### *Liquor Hydrogenii Peroxidi.*

Dose.  $\frac{1}{2}$  to 2 drs.

Is slightly acid (due to the addition of  $H_2SO_4$  to preserve it).

Contains from 9 to 11 volumes of available oxygen per volume; it is readily decomposed and difficult to keep.

### Pharmacology.

ANTISEPTIC, DISINFECTANT, BLEACHING  
AGENT, STYPTIC.

ANTISEPTIC AND DISINFECTANT. Acts by the liberation of oxygen.

BLEACHING AGENT. See p. 124.

STYPTIC. See p. 55.



## Therapeutics.

ANTISEPTIC AND DISINFECTANT. Peroxide of hydrogen is antiseptic in very dilute solutions, and is sometimes used for cleansing pyorrhoea pockets; its slight acid reaction has made it popular for cleansing teeth, but this is a dangerous principle to follow.

As a root-canal dressing it is an efficient germicide, and the oxygen, its active ingredient, will penetrate very well, and by bubbling indicate its activity. There is no precipitation of albumin, and some claim that the *débris* is partly removed by the escaping gas. Peroxide of hydrogen quickly loses its power; it has no ill effects on instruments, no bad smell, taste, nor irritant action; it does not stain the tooth (rather the reverse); solutions keep very badly.

As a mouth-wash—

R.

*Liquoris Hydrogenii Peroxidi* ʒ iv.

*Tincturae Calendulae* ʒ ii.

Misce. Ft. collutorium.

Signa. The mouth-wash. To be used as directed.

Sodii Peroxidum. PEROXIDE OF SODIUM.  $\text{Na}_2\text{O}_2$ .

## Materia Medica.

*Characters.* A strongly alkaline, caustic, deliquescent white solid.

*Solubility.*

Sodium peroxide is a white solid which is soluble in water, but if added in bulk so much heat is generated that the oxygen is liberated, and the solution decomposes. In preparing solutions it is very necessary to add the drug in very small quantities at a time, and to keep the solution cool.

**Pharmacology.**

ANTISEPTIC, DISINFECTANT, BLEACHING AGENT,  
SOLVENT, CAUSTIC.

ANTISEPTIC AND DISINFECTANT. Sodium peroxide acts by liberating oxygen, and also by the formation of caustic soda.

BLEACHING AGENT. See p. 124.

SOLVENT. The evolution of gas may help to cleanse root-canals, and the caustic soda is a solvent of fatty *débris*.

CAUSTIC. Due to the rapid evolution of oxygen and presence of caustic soda.

**Therapeutics.**

ANTISEPTIC, DISINFECTANT, AND SOLVENT. A 50% solution is a useful cleansing and disinfecting agent for root-canals. It is efficient and penetrating; its action is soon neutralised, when the soapy remnant should be washed away with warm water. It does not destroy instruments, has no smell, and will not stain the teeth. Solutions are liable to degenerate, but not so freely as peroxide of hydrogen, and it is always necessary to use the rubber-dam to prevent its caustic action on the tissues.

**Iodum.** See p. 29.

**Pharmacology.**

IRRITANT, ANTISEPTIC, DISINFECTANT, ALTERATIVE, BLEACHING AGENT.

ANTISEPTIC AND DISINFECTANT. Iodine acts by precipitating the protoplasm, and entering into loose chemical combination with it. Owing to its volatility it penetrates deeply. 1 in 50 is DISINFECTANT, and 1 in 4,000 ANTISEPTIC.



### Therapeutics.

ANTISEPTIC AND DISINFECTANT. Iodine is a powerful disinfectant, and as the *liquor* or *tincture*, when applied over the roots of teeth as a counter-irritant, probably has a secondary beneficial effect by disinfecting the gum pockets around the neck of the tooth.

As a root-canal disinfectant it is an effectual germicide; its volatility causes it to penetrate well, but not to be permanent. It destroys instruments, and stains everything it comes in contact with. It is an irritant. The stains may be removed by ammonia.

### Iodoformum. IODOFORM. $\text{CHI}_3$ .

#### Materia Medica.

*Source.* Produced by the action of iodine on alcohol in the presence of potassium carbonate.

*Dose.*  $\frac{1}{2}$  to 3 grs.

#### *Solubility.*

Slightly in water,  
1 in 80 of alcohol,  
1 „ 5 „ ether,  
1 „ 14 „ chloroform.  
Freely soluble in fixed and volatile oils.

*Composition.* Contains about 96% of iodine.

#### Pharmacology.

ANTISEPTIC, DISINFECTANT(?), LOCAL ANÆSTHETIC, MUMMIFYING AGENT.

ANTISEPTIC AND DISINFECTANT. Germs have been known to live in a strong solution of iodoform, and wounds have been infected by the use of the dry

powder. Iodoform only appears to act by becoming decomposed and setting free iodine. The vapour of iodoform inhibits the growth of some micro-organisms.

LOCAL ANÆSTHETIC. Iodoform acts as a direct sedative to nerve endings.

MUMMIFYING AGENT. By forming an aseptic scab and permeating the pulp with iodine.

### Therapeutics.

ANTISEPTIC. It is used in surgery, partly for its mechanical effect in drying up discharges and as a non-irritant antiseptic. Solutions in ether have a decided action against the tubercle bacillus. It is decomposed by the discharge from wounds, and gives off iodine.

In the mouth iodoform is very objectionable on account of its taste and smell, but on account of its non-irritant antiseptic qualities it is often used after amputation of the tongue, applied in the form of a paint dissolved in ether (*Whitehead's varnish*; the compound tincture of benzoin, in which ether has been substituted for alcohol, and 10% of iodoform added), or as *iodoform gauze* to pack sinuses, &c.

As a root dressing it is a doubtful disinfectant, and a mild antiseptic with very little penetrating power; it is fairly permanent, does not destroy instruments, or stain the tooth. It has a persistent, penetrating, unpleasant odour, but is entirely non-irritant.

For covering the smell of iodoform the addition of 1% each of *Coumarin* and *Otto of Roses* is very serviceable. The smell of iodoform may be removed from the hands by a watery solution of tannic acid, chloroform, ether, or soap liniment.

### Toxicology.

Iodoform may be absorbed from a large wound and cause poisoning.



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*Symptoms of poisoning.*

An eruption on the skin.

Vomiting, fever, delirium and collapse.

*Treatment.*

Discontinue the drug, and give stimulants if necessary.

**Iodol.** TETRA-IODO-PYRRHOL.  $C_4I_4NH$ . Not official.

**Materia Medica.**

*Solubility.*

Insoluble in water.

Soluble in alcohol, ether, chloroform.

**Pharmacology and Therapeutics.**

It is an odourless substitute for iodoform, having much the same action. It is not toxic. Is powerfully deodorant, hence is a useful dressing for septic roots.

The following drugs also belong to this class and have similar properties and actions: Aristol, Traumatol (Iodo-cresol), Airol, Di-iodoform, Europhen, Iodoformal, Loretin, Losophan, Nosophen, Sanoform, Soziiodol, Di-iodo-salicylic acid.

All unofficial, and none containing so high a percentage of iodine as iodoform (96%) and iodol (90%).

**Calx Chlorinata.** See p. 43.

Chlorine, which is given off from solutions of this drug, acts similarly to iodine, and is a powerful disinfectant and deodorant. The *Liquor calcis chlorinatae* forms a useful antiseptic, stimulant and deodorant gargle, or mouth-wash. See p. 43.

**Acidum Carbolicum.** CARBOLIC ACID.  $C_6H_5OH$ .

**Materia Medica.**

*Synonyms.* Phenol. Phenic acid.

*Dose.* 1 to 3 grs.

*Solubility.*

1 in 12 of water,  
6 „ 1 „ alcohol,  
3½ „ 1 „ glycerine.  
Freely in olive oil, chloroform, liquor potasse,  
and volatile oils.

*Characters.* Hygroscopic crystals with a tarry odour ;  
becomes and remains fluid on the addition of 10%  
of water. It does not redden blue litmus-paper.

*Preparations.*

**Acidum Carbolicum Liquefactum** (91 %).

*Dose.* 1 to 3 mins.

**Glycerinum Acidi Carbolic**i, 1 in 5.

**Pharmacology.**

ANTISEPTIC, DISINFECTANT, CAUSTIC, LOCAL  
ANÆSTHETIC.

ANTISEPTIC AND DISINFECTANT. Carbolic acid  
causes a coagulation of the germ protoplasm, without  
entering into combination with it, and, being volatile,  
is thus able to penetrate more deeply than the metallic  
salts. It is ANTISEPTIC 1 in 300 and DISINFECTANT  
1 in 20. It is unaffected by alkalies or soap. It will  
not destroy spores.

CAUSTIC. See p. 25.

LOCAL ANÆSTHETIC. See p. 103.

**Therapeutics.**

ANTISEPTIC AND DISINFECTANT. Carbolic acid  
1 in 20 applied for one minute will destroy all the



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pathogenic germs likely to be met with in the mouth. A solution of this strength applied to wounds is an irritant to the tissues, and causes much exudation. This is not prevented by its local anæsthetic action.

As an antiseptic mouth-wash, 1 in 250 carbolic is very useful, having a not unpleasant taste, and a local anæsthetic action which quickly follows the initial smarting sensation.

R.

*Liquoris Potassae*

*Acidi Carbolic Liquid*      *āā.* 3 *iv.*

*Aquam*      *ad.* 3 *iv.*

Misce. Fiat collutorium.

Signa. The mouth-wash.

One teaspoonful in a wineglassful of water to be held in the mouth for three minutes, after proper brushing, three times a day.

For cleansing root-canals carbolic has the following advantages and disadvantages: It is an efficient germicide, 1 in 20 or pure; has no action on steel instruments, nor bad smell. It does not stain the teeth. It has only moderate penetrating power; it coagulates albumin. The strong drug will produce a local necrosis with any tissue with which it accidentally comes in contact; being volatile it is not permanent as a dressing.

It is very valuable for the disinfection of instruments, 1 in 20. It may also be used in the same strength for the disinfection of small wounds by direct application to the part, bearing in mind that it will increase exudation. Carbolic may be absorbed from dressings to large wounds and cause poisoning.

Watery solutions are more powerful than solutions in oil or glycerine.

**Toxicology.**

1 fluid drachm has killed a man.

*Symptoms of poisoning.*

Burning pain in mouth and stomach.

Vomiting (occasionally), dyspnœa.

Giddiness, weakness, and collapse.

Urine is suppressed, or, if passed, soon turns green, and then dark brown.

*Treatment.*

Wash out the stomach with *saccharated lime water*, and give  $\frac{1}{2}$  oz. of *magnesium sulphate*.

Stimulants, warmth, and artificial respiration.

Should carbolic be accidentally dropped on the lip or cheek, at once rub the spot with *oil* or *glycerine* to dissolve it out.

**Creosotum. CREOSOTE.**

**Materia Medica.**

*Dose.* 1 to 5 mins.

*Source.* Obtained by distillation of wood tar.

*Characters.* A colourless or brownish liquid, with a strong odour and burning taste.

*Composition.* A mixture in varying proportions of guiacol, creasol, and other phenols; sometimes contains carbolic acid as an impurity.

*Solubility.* Sparingly in water; freely in alcohol or ether.

*Incompatible.* Oxide of silver, with which an explosive compound is formed.



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### Pharmacology.

DISINFECTANT, ANTISEPTIC, DEODORANT,  
LOCAL ANÆSTHETIC.

Creosote has the same actions as carbolic acid, though, owing to its uncertain composition and strength, the latter is preferred for most purposes.

### Therapeutics.

Creosote as a dressing for foul root-canals is similar to carbolic acid, but considerably more **lasting in its effects**. The odour is more unpleasant.

**Beta-Naphthol.** NAPHTHOL. One of the phenols of naphthaline.  $C_{10}H_7OH$ . Not official.

### Materia Medica.

*Dose.* 3 to 10 grs.

#### *Solubility.*

1 in 1,000 of water.  
1 „ 2 „ alcohol.  
1 „ 12 „ olive oil.

*Preparations.* **Hydronaphthol** (*a trade name*).

### Pharmacology.

Beta-naphthol acts in a similar manner to carbolic acid.

### Therapeutics.

DISINFECTANT AND ANTISEPTIC. Beta-naphthol is a powerful antiseptic in saturated watery solutions.

As a disinfectant for carious cavities and dead teeth, hydronaphthol must be used with due regard

to its solubility. It has no penetrating power in moist dentine, but if the dentine is first dehydrated with alcohol, and an alcoholic solution 1 in 100 used, it will penetrate sound dentine freely, and disinfect as it goes. For root-canals it is an efficient germicide (incompatible with moisture as far as penetration is concerned), very penetrating and permanent; it has no effect on steel instruments; has a warm taste, no smell, and is non-irritant. It should be dissolved in alcohol.

It is useful for placing in root canals and pulp cavities in cases of rhizodontophy on account of its slight solubility and great antiseptic action.

## **Formic Aldehyde.** Not official.

### **Materia Medica.**

#### *Solubility.*

Mixes readily with water or alcohol, but not ether.

#### *Preparation.*

#### **Formaline.** Non-official.

40% solution of formic aldehyde.

### **Pharmacology.**

ANTISEPTIC, DISINFECTANT, FIXING AGENT,  
IRRITANT, MUMMIFYING AGENT.

### **Therapeutics.**

**Formic Aldehyde** solutions or vapour are powerful disinfectants, the latter also having the advantage of possessing about the same specific gravity as air, with which it therefore diffuses very evenly, and can so be used for the disinfection of



rooms and delicate apparatus. A 2% solution is a good fixing and hardening agent for pathological specimens. A 4% solution is a good general disinfectant. *Formaline* is a powerful irritant with a very lasting painful action; thus a 1% solution is as strong as it may be used in the mouth. Its great penetrating power makes its employment in strong solutions, even in root treatment, dangerous. Formaline is a most excellent deodorant either for rooms or substances.

The proprietary preparation called "*Formagen*" does not appear to contain any Formaline. Formaline as an application to sensitive dentine, with the view of coagulating the fibrils, is unsatisfactory, as it causes pain and is very liable to destroy the pulp.

### **Acidum Benzoicum.** BENZOIC ACID. $C_6H_5COOH$ .

#### **Materia Medica.**

*Dose.* 5 to 15 grs.

*Solubility.* 1 in 400 of water,  
1 ,, 3 ,, alcohol,  
1 ,, 30 ,, glycerine.

The addition of borax increases the solubility in water.

#### **Pharmacology.**

##### ANTISEPTIC, DISINFECTANT, CAUSTIC.

Benzoic acid has a similar action to that of carbolic acid, but is less penetrating because less volatile. It is ANTISEPTIC 1 in 900, and DISINFECTANT 1 in 100, this latter strength being too caustic to be used in the mouth except on the brush.

# Therapeutics.

Benzoic acid or its salts are used as an ingredient in antiseptic and disinfectant mouth-washes.

R.

<i>Sodii Bicarbonatis</i>	3 jss.
<i>Boracis</i>	3 jss.
<i>Sodii Benzoatis</i>	gr. iv.
<i>Sodii Salicylatis</i>	gr. iv.
<i>Eucalyptol</i>	gr. ij.
<i>Thymol</i>	gr. ij.
<i>Menthol</i>	gr. i.
<i>Oleum Gaultheriæ</i>	m. i.
<i>Aquæ</i>	3 xii.

Misce. Ft. collutorium.

Signa. The mouth-wash.

To be diluted with an equal amount of water.

Burroughs, Wellcome & Co.'s "Soloid" Nasal  
(Eucalyptia Compound).

# Eucalypti Oleum. EUCALYPTUS OIL.

## Materia Medica.

*Dose.*  $\frac{1}{2}$  to 3 mins.

*Source.* The oil distilled from fresh leaves of Eucalyptus globules and other species of eucalyptus.

*Solubility.* 3 in 1 of alcohol.

## Pharmacology and Therapeutics.

ANTISEPTIC, DISINFECTANT, ANTIPERIODIC,  
PERFUMING AGENT.

As a disinfectant for root-canals, eucalyptus is a feeble germicide. It is viscid and does not penetrate well; is a solvent of gutta-percha, and if sealed in



by this only it will constantly leak out into the mouth, where its continual presence is nauseating. It is non-irritant, has no action on instruments, and does not stain the tooth. Its odour is liable to hide that due to putrefaction.

### **Aromatic Oils**

Are all mild ANTISEPTICS AND DISINFECTANTS, but their action is not quick enough to be of much use. Their stimulant and anæsthetic actions are more important ; the fact that they are also antiseptic and even mildly disinfectant is a fortunate addition.

## ANTACIDS.

**Antacids** are applications which neutralise abnormal acidity of the mouth.

In works on general pharmacology the term antacid is generally applied to remedies which, given internally, reduce the acidity of the contents of the stomach.

In contending against pathological acidity of the oral cavity, a condition which is a fertile cause of caries, prophylactic (preventive) measures are of the first importance. The chief of these is **cleanliness**. By removing fermentable matter, and reducing the number of organisms, acid fermentation, the chief cause of acidity in the mouth, is prevented.

In many general diseases an acid condition of the mouth is likely to arise. The commonest condition is dyspepsia (either primary or depending on some other cause, such as pregnancy), when acid eructations are likely to occur; the suitable treatment of the dyspepsia will remedy the effect.

In all acute illnesses, especially the specific fevers, much fermentation and acidity, very destructive to the teeth, frequently occurs.

This is due partly to abnormal secretions, partly to the absence of the natural cleansing action of the solid food and masticatory movements, and partly to the fact that the staple of the diet is milk, which quickly undergoes acid fermentation.

In acute illnesses, therefore, careful cleansing of



the mouth by the patient, or nurse, is more than ever essential.

The most readily acidly fermentable foodstuffs are boiled vegetables, sticky, sugary compounds, and sticky, starchy foods.

Antiseptics as preventing fermentation, and sialogogues by producing a free flow of alkaline saliva, act as antacids.

The drugs employed to directly neutralise the acids of the mouth are alkalies, but the drawback to their efficiency lies, not in the weakness of their action, but in the shortness of the time they remain in the mouth, and their lack of penetration.

Chalk, being insoluble, will penetrate least, and by lodging between the teeth and gums may mechanically do more harm than good. Though it is insoluble in water, the chalk combines with acids to form neutral salts.

Liquor potassae and the more soluble alkalies penetrate well and act vigorously, but are quickly washed away.

Hence the magnesium salts are the most effectual applications, as they are but slightly soluble.

An effectual antacid, by arresting or slowing the progress of caries, will appreciably reduce the sensitiveness of shallow cervical cavities in a few weeks.

It must not be forgotten that a too free or prolonged use of alkaline washes may lead to the rapid formation of tartar.

The amount of lactic acid required to neutralise—

1 drachm of *Liquor Potassae* is 5·6 grs.

1 drachm of *Magnesium Hydro-Carbonate* is 10·5 grs.

1 drachm of *Sodii Bicarbonas* is 63·4 grs.

1 drachm of *Liquor Calcis* is 0·27 grs.

**Potassii Hydras.** See p. 23.

## Pharmacology and Therapeutics.

## CAUSTIC, ANTACID, SOLVENT.

Weak solutions, **1 in 200**, of Caustic potash are used as a mouth-wash, usually in combination with carbolic acid (see p. 76), with the object of dissolving away the mucus, fat, and dead epithelial cells, and so cleansing the mouth. This action permits other drugs, and the tissues, to act at greater advantage.

*Liquor Potassae* is a powerful and penetrating antacid, but is quickly washed away by the saliva.

**Magnesiae Carbonas Ponderosa.** MAGNESIUMHYDRO-CARBONATE.  $3 (\text{MgCO}_3), \text{Mg}(\text{HO})_2, 4 \text{H}_2\text{O}$ .

## Materia Medica.

*Dose.* 5 to 30 grs.

*Solubility.*

1 in 9,000 of cold water.

Slightly soluble, when freshly precipitated, in water charged with carbonic acid, forming—

*Preparation.*

*Liquor Magnesiae* (B.P.). 10 grs. to 1 oz.

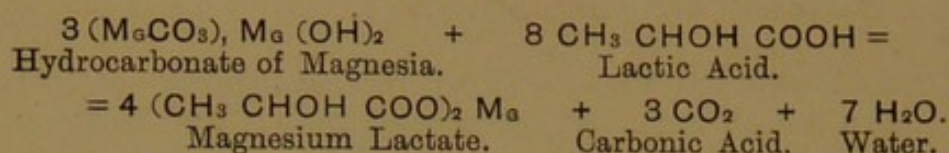
## Pharmacology and Therapeutics.

The heavy hydro-carbonate of magnesia is an active antacid, and being very slightly soluble in water it is not readily washed away, but remains in the mouth for some time ; hence it is our most efficient  
DIRECT ANTACID.

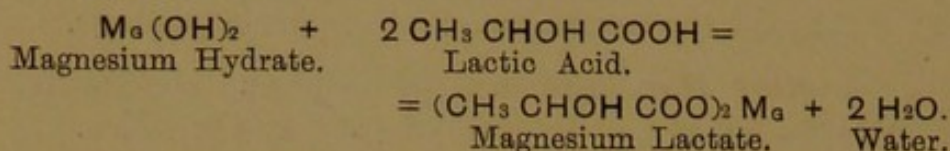


*Milk of Magnesia* and *Maglactis* are proprietary preparations supposed to contain the hydrate of magnesia.  $Mg(OH)_2$ .

The formula for the interaction between the hydrocarbonate and lactic acid is



And for that between magnesium hydrate and lactic acid—



R.

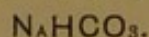
<i>Hydrate of Magnesia</i>	4 drs.
<i>Gum Tragacanth</i>	1½ drs.
<i>Rose Water</i>	2 drs.
<i>Water</i> to make up	12 oz.

Mix. Let a mouth-wash be made.

Label. The mouth-wash.

To be well shaken before using. A teaspoonful to be spread over the teeth at night.

## Sodii Bicarbonas. SODIUM BICARBONATE.



### Materia Medica.

*Synonym.* Washing soda.

*Dose.* 5 to 30 grs.

*Solubility.*

1-12 of water.

Insoluble in alcohol.

## Pharmacology and Therapeutics.

Bicarbonate of soda has an action similar to, but weaker than, caustic potash; and is sometimes used as an ingredient of antiseptic and alkaline mouth-washes. The following is a mild and useful prescription:—

R.

<i>Sodii Bicarbonatis</i>	gr.	xx.
<i>Acidi Carbolic</i>	gr.	ii.
<i>Sodii Bi Boratis</i>	gr.	xx.
<i>Aquae</i>	℥	iv.

Misce. Fiat collutorium.

Signa. The mouth-wash.

To be diluted with an equal amount of water.

**Calcii Hydras.** HYDRATE OF CALCIUM.  $\text{Ca}(\text{OH})_2$ .

## Materia Medica.

*Synonym.* Slaked lime.*Solubility.*

Slightly soluble in water (1 in 900).

Much more soluble in a solution of sugar.

*Preparations.**Liquor Calcis* (lime water), 1 in 900.

Dose. 1 to drs.

*Liquor Calcis Saccharatus*, 1 in 62.

Dose. 20 to 60 mins.

*Linimentum Calcis*, 1 in 800. (Carron oil.)

(Equal parts of solution of lime and olive oil.)

*Potassa cum Calce.* See p. 23.



**Pharmacology and Therapeutics.****ANTACID, ASTRINGENT, SEDATIVE.**

*Liquor Calcis* is very little used as an antacid in the mouth. It is added to milk to render the curd finer and more digestible. *Liquor Calcis Saccharatus* is an antidote for poisoning by carbolic acid.

## LOCAL ANÆSTHETICS, LOCAL ANODYNES, OBTUNDENTS.

**Local Anæsthetics** (*ἀν* without, *ἄισθησις* perception).

Reduce or destroy temporarily the sensibility of a part by interference with the functions of the peripheral extremities of sensory nerves.

**Example.**—Cocaine applied to gum to render it insensitive while fitting a collar to a root.

**Local Anodynes** (*ἀν* without, *ὀδύνη* pain).

Means employed locally for relief of pain.

**Example.**—Morphine added to pastes used for devitalising the pulp.

**Obtundents** (*Obtundo*, I make blunt or dull).

Agents used to deaden pain; in dental practice the term is usually employed to denote means for reducing the sensibility of dentine.

**Example.**—Nitrate of silver applied to carious dentine before excavation.

These agents include :—

### 1. Cold.

Prolonged or extreme cold causes first numbness and then complete local anæsthesia, by reducing the function of sensory nerves.

**Example.**—Cold produced by chloride of ethyl or ether spray to freeze the gum before extraction of stumps or dead teeth.



Moderate cold may have a distinct anodyne action by reducing the excessive blood-supply.

**Example.**—A patient holding cold water in the mouth to relieve aching of an actively congested pulp.

## 2. Heat.

Extreme heat destroys the irritability of protoplasm, and so is often employed as an obtundent.

**Example.**—Hot air blast on sensitive dentine.

Moderate heat acts as an anodyne in inflammatory disturbance by dilating and relieving the blood-vessels, and increasing osmosis and migration of cells.

**Example.**—Fomentations in periodontitis.

## 3. Drugs.

- (i). May act by directly depressing the nerve fibrils.
- (ii). Through the blood-vessels. See Cold and Heat.
- (iii). By destruction of protoplasm.

Some drugs which destroy living protoplasm (caustics) may act as local anæsthetics by destroying entirely the nerves or fibrils of the part. On this account, therefore, care must be used in their application to other purposes, as extensive damage to tissue may ensue before the patient is aware of it.

**Example.**—Skin of face burnt by the running down of carbolic acid or chloroform.

Caustic drugs are, however, frequently of much service for their obtundent action.

**Example.**—Silver nitrate.

As regards sensitive dentine, it should always be remembered that the skilful use of sharp instruments is the *sine quâ non* of causing such patients the minimum of pain.

**Rest**, secured by the use of protective dressings, is a valuable obtundent.



Drugs may be applied by painting or rubbing in, by hypodermic injection, or by electrical cataphoresis.

**HYPODERMIC INJECTION.** In administering drugs by this method, the chief points to be considered by the dental surgeon are:—

1. Absolute **sterilisation** of the syringe and solutions, and as far as possible that of the tissues also, followed by the maintenance of an aseptic condition of the mouth for a few days afterwards.

2. The **distension** (as shown by blanching) of the tissues to be anæsthetised.

This requires a well made syringe and the use of considerable force on the piston.

3. The avoidance of **veins** (shown by the sudden easy injection of the solution, and possibly by sudden faintness of the patient).

4. The avoidance of **damaging the tissues** unnecessarily with needle, or passing it through or into any septic focus, such as the pocket of gum at the neck of a tooth.

**CATAPHORESIS.** An electric current has the property of causing certain chemical substances to penetrate organised tissues in its path. Hence it may be used to secure greater penetration of living tissues by various drugs, and local anæsthetics among these. In dentistry it is sometimes employed to secure penetration of cocaine and allied drugs in order to obtund sensitive dentine, or anæsthetise a live pulp before removal. The process is a tedious one and not invariably successful.

In selecting a local anæsthetic for tooth extraction one is guided mainly by the possibility of thorough application, and the tolerance of the patient to the preliminary steps; also by the risk of subsequent septic inflammation.



In the choice of obtundents for sensitive dentine we have to consider the

1. Cause of the sensitiveness.
2. Depth of penetration and efficacy of the drug.
3. Rapidity of action.
4. Initial pain.
5. Staining effect.

**Cocainae Hydrochloridum.** HYDROCHLORIDE  
OF COCAINE.

**Materia Medica.**

*Source.* The hydrochloride of an alkaloid obtained from *Erythroxylum coca*.

*Dose.*  $\frac{1}{8}$  to  $\frac{1}{2}$  gr.

*Characters.* Colourless acicular crystals or a crystalline powder.

*Solubility.* 2 in 1 of cold water.  
1 „ 4 „ alcohol.

**Note.** Aqueous solutions of cocaine quickly decompose.

*Preparation.* *Injectio Cocainae Hypodermica*  
(B.P.). 1 in 10.

Cocaine hydrochloride, 33 grs.; Salicylic acid,  $\frac{1}{2}$  gr.;  
water, 6 drs.

*Dose.* 2 to 5 mins.

**Pharmacology.**

LOCAL ANÆSTHETIC, OBTUNDENT, ANODYNE,  
NERVINE STIMULANT.

LOCAL ANÆSTHETIC. Cocaine is a powerful poison to all forms of protoplasm, and acts by paralyzing the nerve terminations. It will also paralyse the nerve trunks if injected into them, but this practice is not recommended.

**Therapeutics.**

**LOCAL ANÆSTHETIC.** An interval of from 5 to 10 minutes is required before the full anæsthetic effect of cocaine is produced. The anæsthesia passes off in half an hour.

Used for removing polypi of gum, extracting stumps or teeth. May be painted on the gum in the form of a 10% solution.

Cocaine has been used in dentistry in the form of the hypodermic injection before extraction of teeth ; but it is better **never** to employ it in this form, but to use eucaine instead, for the following reasons :—

(i). Cocaine is 3 or 4 times as poisonous.

(ii). Cocaine solution quickly decomposes and is difficult to keep free from fungi, whereas eucaine solutions keep well, and may be boiled (and consequently sterilised) each time before use, without fear of decomposing the drug.

Cocaine is all but useless for obtaining anæsthesia of a tooth pulp in which there is vitality, if merely applied to it as a solution or the crystals. The drug, may, however, be made to penetrate the pulp and render it completely insensitive in most cases by cataphoresis. This, however, is a tedious and not quite invariably successful process.

A solution of cocaine (4%), applied in the form of a spray to the palate and fauces, is sometimes useful in checking retching during the taking of an impression.

**ANODYNE.** Sometimes useful to relieve pain of acute periodontitis, painted on the gum outside roots. Acts by contracting vessels and diminishing supply of blood to the part.

**OBTUNDENT** to sensitive dentine used with electric cataphoresis. (Useless if simply painted on.)



**Toxicology.**

Is a drug to be employed with caution, as alarming symptoms may follow an overdose. In no case should more than  $\frac{3}{4}$  gr. be injected at once.

9 grs. swallowed and 20 mins. of *injection* are recorded as having caused poisoning.

*Symptoms of Poisoning.*

Fainting, possibly convulsions ; delirium.

Acceleration and weakening of pulse ; dyspnoea.

Dilatation of pupils.

*Treatment.*

Stimulants. Ammonia.

*Amyl nitrite* inhalation.

Warmth ; recumbent posture ; artificial respiration.

**Eucainae Hydrochloridum. HYDROCHLORIDE  
OF EUCAINE.****Materia Medica.**

Two salts are met with under this name, synthetic compounds chemically allied to cocaine, though differing in constitution.

*Alpha-Eucaine.*

*Characters.* Small colourless crystals.

*Solubility.* 1 in 10 of water.

*Beta-Eucaine.*

*Characters.* Small glistening white crystals.

*Dose.* As a hypodermic injection 20 to 30 mins.  
of a 4% solution.

*Solubility.* 1 in 20 of water.

### Pharmacology.

**LOCAL ANÆSTHETIC.** Action similar to cocaine, but somewhat slower, and anæsthesia more prolonged. Has between one-third and one-quarter the toxicity (poisonous action) of cocaine, hence should be preferred for hypodermic injection, for which purpose *Beta-Eucaine* is best used, as alpha-eucaine sometimes gives rise to local swelling of the tissues.

### Therapeutics.

By the hypodermic injection of **20 mins.** of a **4%** solution of eucaine perfect anæsthesia can be obtained in ordinary healthy tissue, and it is the best **LOCAL ANÆSTHETIC** to use during extraction of teeth.

**Note.** The infiltrated area is usually quite anæsthetic 1 minute after injection.

Inflamed tissue is difficult to infiltrate, and often the injection causes pain.

In very loose or very dense tissue, or parts difficult of access, partial analgesia only is obtained.

The injection of **5 mins.** of a **4%** solution of eucaine into the gum around the neck of a tooth affected with periodontitis, without attempting to anæsthetise the periosteum far up, will often give very considerable relief during extraction of the tooth.

### **Aconitum.** ACONITE.

#### **Materia Medica.**

*Synonym.* Monk's-hood.

*Source.* Root of *Aconitum napellus*.



*Preparations.*

*Tinctura Aconiti*, 1 in 20. Dose. 2 to 15 mins.

*Fleming's Tincture of Aconite*, 1 in  $1\frac{1}{2}$ .

Dose.  $\frac{1}{8}$  to 1 min.

The latter preparation (about twelve times the strength of the former) is sometimes ordered for external application, but is of a dangerous strength to use in the mouth without caution.

**Pharmacology.**

LOCAL ANÆSTHETIC, ANODYNE, FEBRIFUGE.

LOCAL ANÆSTHETIC, ANODYNE. Applied locally aconite paralyses the terminations of the sensory nerves, causing first a sensation of tingling, then numbness.

FEBRIFUGE. Administered internally in frequent small doses, aconite reduces force and frequency of pulse, flushes skin, and lowers temperature. Used in general therapeutics to control fever and pain.

**Therapeutics.**

Used in dentistry in conjunction with IODINE when the counter-irritant properties of the latter are desired, to relieve the pain caused. It appears also to have a distinct effect in controlling local inflammatory action.

**Toxicology.**

On account of its depressing action on the heart, aconite is a powerful poison.

25 mins. of *Fleming's tincture* have killed a man.

*Symptoms of poisoning.*

Tingling and burning of lips, mouth and throat.  
Epigastric pain, nausea, vomiting.  
Irregular feeble pulse ; dyspnœa.  
Dilated pupils.

*Treatment.*

Wash out stomach.  
Warmth, stimulants, artificial respiration.  
Hypodermic injection of 20 mins. of *Tr. Digitalis*.

**Belladonna.** BELLADONNA.**Materia Medica.**

*Source.* The leaves and root of *Atropa belladonna*, or deadly nightshade.

*Preparations.*

From leaves, *Extractum Belladonnae viride*.  
From roots, *Extractum Belladonnae Liquidum*.  
*Linimentum Belladonnae*.

**Atropinae Sulphas.** SULPHATE OF ATROPINE.

An alkaloid obtained from the belladonna plant.

*Dose.*  $\frac{1}{200}$  to  $\frac{1}{100}$  gr.

*Characters.* Colourless acicular crystals.

*Solubility.*

1 in 1 of water,  
1 „ 10 „ alcohol.  
Insoluble in ether and chloroform.



### Pharmacology.

ANODYNE AND LOCAL ANÆSTHETIC. Diminishes all secretions (thus, ANTISIALAGOGUE), quickens pulse by paralysing vagus nerve endings in heart; first raises, then lowers blood pressure, DILATES PUPIL.

ANODYNE. Belladonna depresses the sensory nerve endings, and when applied locally to an inflamed part the anodyne effect is aided by a relaxation of the blood-vessels after preliminary contraction.

### Therapeutics.

The *extract* or *green extract* is of use in the treatment of inflamed glands, and seems to have a considerable effect in reducing the inflammation and even preventing suppuration, while relieving the pain. These preparations should be prescribed 1 part to 2 of glycerine (as the latter substance causes the Belladonna to be absorbed), to be painted on the affected part and covered with flannel or spongiopiline. *Liniment of Belladonna* may be employed locally in neuralgic affections, alone, or in combination with aconite. *Atropine* is sometimes added to devitalising powders instead of morphine.

ANTISIALAGOGUE. See p. 108.

Toxicology.  $\frac{1}{2}$  gr. of atropine has killed a man.

#### *Symptoms of poisoning.*

Dry throat, thirst, difficulty in swallowing.  
Vomiting.  
Widely dilated pupils.  
Small rapid pulse, flushing, a rash.  
Delirium, coma.

*Treatment.*

Wash out stomach.

Give  $\frac{1}{4}$  gr. of *pilocarpin*.

Brandy, strong coffee, artificial respiration.

**Opium and its preparations. Morphine.**

See p. 170.

**Pharmacology and Therapeutics.**

In contrast with the powerfully GENERAL SEDATIVE action of these drugs their local sedative action is small. They, however, possibly possess some local ANODYNE action.

*Morphine* is added to arsenical devitalising pastes and "fibre" with the object of lessening the pain caused.

*Tincture of Opium* (laudanum) on cotton-wool in a carious cavity will sometimes relieve odontalgia, though this may be rather the result of the alcohol contained in the preparation.

A fomentation made by breaking up six *poppy capsules* in a quart of water, then boiling down to a pint, may relieve pain after tooth extraction, used frequently hot in the mouth, the patient being told not to swallow any. Here, again, it is the heat probably that has the anodyne action rather than any small quantity of opium contained in the solution.

**Oleum Caryophylli.** OIL OF CLOVES.

and

**Oleum Cinnamomi.** OIL OF CINNAMON.

**Materia Medica.** Dose.  $\frac{1}{2}$  to 3 mins.

*Source.* The oils distilled from cloves and cinnamon bark respectively.



*Soluble* in spirit or ether.

*Incompatibles.* Clove oil is incompatible with lime water, salts of iron, mineral acids, gelatine.

### Pharmacology.

Typical members of an important pharmacological group known as "aromatic volatile oils."

LOCAL ANÆSTHETIC, OBTUNDENT, ANODYNE, ANTISEPTIC, STIMULANT, SIALAGOGUE, FLAVOURING AGENT.

LOCAL ANÆSTHETIC. Action incomplete, and of little practical use.

Primarily powerfully STIMULANT, the anæsthetic effect is brought about by over-stimulation and consequent exhaustion for the time being of the ends of the sensory nerves.

ANODYNE AND OBTUNDENT. Partly from their sedative action on the nerves, and partly from their action in dilating the blood-vessels, these oils tend to cause resolution of inflammation when applied locally.

ANTISEPTIC. See p. 82.

STIMULANT AND SIALAGOGUE. See p. 107.

AS FLAVOURING AGENTS. See p. 113.

### Therapeutics.

ANODYNE. From the actions mentioned above, clove and cinnamon oils are often of service in relieving the pain of an exposed, inflamed, or irritable tooth pulp when applied to the cavity.

OBTUNDENT. Sometimes useful in allaying the sensitiveness of dentine; best applied for some minutes and then dried in with hot air syringe.

**Eugenol or Eugenic Acid.**

The active principle of clove and cinnamon oils.

**Action and uses :** Similar to these ; by some considered more efficacious.

**Camphora. CAMPHOR.****Materia Medica.**

*Dose.* 2 to 5 grs.

*Source.* A stearoptene obtained from the wood of *Cinnamomum camphora*.

*Characters.* Tough, solid, transparent, colourless masses, with characteristic odour.

*Solubility.* Readily in alcohol, chloroform, or ether.

1 in 700 of water.

1 „ 2 „ oil of turpentine.

1 „ 4 „ olive oil.

*Preparation.*

*Spiritus Camphorae.* 1 in 10 rect. spirit.

*Dose.* 5 to 20 mins.

**Pharmacology and Therapeutics.**

Camphor rapidly penetrates the skin and irritates the tissues, causing a burning sensation and dilatation of the vessels. This is soon followed by a sedative action on the nerve terminations.

**LOCAL ANÆSTHETIC.** *Spiritus Camphorae* mixed with equal parts of ether and chloroform, and applied to the gum before tooth extraction. Its efficacy is not very great.



ANODYNE. Camphor is often combined with other drugs as a liniment in neuralgia.

R.

*Chloral Hydras*

*Menthol*

*Thymol*

*Camphor*

$\bar{a}\bar{a}$  3 j.  
3 iii.

Tere et misce. Fiat linimentum.

Signa. Paint on the affected part with a brush.

OBTUNDENT. The *spirit* is used to relieve the pain of sensitive dentine ; and from its sedative action allays retching during the taking of an impression of the mouth, if previously the fumes be inhaled for a few minutes.

ANTISEPTIC. Camphor has a weak antiseptic action.

## **Menthol.** MENTHOL.

### **Materia Medica.**

*Synonym.* Peppermint camphor.

*Source.* A stearoptene obtained from *Mentha arvensis* and *Mentha piperita*.

*Dose.*  $\frac{1}{2}$  to 2 grs.

*Solubility.*

Sparingly in water.

Freely in spirit.

### **Pharmacology and Therapeutics.**

Closely resembles camphor (*which see*). The ANODYNE action is more marked, and this drug is frequently employed as a local **anti-neuralgic**, in the form of sticks or pencils to be rubbed on the painful part, or as a liniment, such as that given under camphor.

**Alcohol Ethylicum.** ETHYLIC ALCOHOL.**Pharmacology and Therapeutics.**

**ANODYNE.** When diluted and used as a lotion is a refrigerant. See **Anodyne action of cold.**

In the form of *brandy* or *whisky* held in the mouth it is a popular remedy for an aching tooth; its efficacy in this respect may partly depend on its refrigerant properties.

**OBTUNDENT.** Relieves pain of sensitive dentine by coagulating contents of dentinal tubules, which it may be made to penetrate by first drying out the cavity thoroughly with amadou and hot air syringe.

**Carbolic Acid.** See p. 75.**Pharmacology and Therapeutics.**

**LOCAL ANÆSTHETIC.** Carbolic acid has in addition to its other actions that of a local anæsthetic, in part due to its properties as a caustic, but also to a distinct sedative effect upon sensory nerve endings. It is employed for this purpose in cutting away quite small polypi of the gum or pulp, in the form of *Acidum Carbolicum Liquefactum* painted on the part; for larger operations of the kind it is useless, as it does not penetrate deeply.

**LOCAL ANODYNE.** Strong carbolic acid applied on wool to a carious cavity is one of the most powerful remedies we possess for odontalgia due to an exposed or inflamed pulp, often relieving the pain instantly. It forms the chief ingredient in many quack "toothache cures." In the strength of **1 in 10**, or **1 in 20**, applied on a pledget of wool to the socket of an extracted tooth it relieves the subsequent aching.



**OBTUNDENT.** Strong carbolic, dried in with hot air, is a useful remedy for over-sensitive dentine, and acts by coagulating the contents of the dentinal tubules.

A solution of carbolic, **1 in 40**, may be used to gargle the mouth with before taking impressions, and from its sedative action is useful in preventing retching.

### **Acidum Arseniosum, Argenti Nitras, Zinci Chloridum.**

All act as **OBTUNDENTS** to sensitive dentine by means of their **CAUSTIC** action. See pp. 17, 19, 20.

### **Æthyl Chloridum. ETHYL CHLORIDE.**

#### **Materia Medica.**

*Synonym.* Hydrochloric ether.

*Character.* A colourless liquid (gaseous at ordinary temperatures) with a low boiling point, about 50° F.

#### **Pharmacology and Therapeutics.**

**LOCAL ANÆSTHETIC** (refrigerant), **GENERAL ANÆSTHETIC.**

**LOCAL ANÆSTHETIC.** On account of the intense cold produced by its evaporation it is used for operations, such as extraction of stumps or cutting away small portions of polypi of the gum. (See Cold.) To "freeze" the part satisfactorily it must be dried, and the chloride (which is volatilised by the warmth of the hand) directed from the nozzle of the capsule

in which it is usually supplied, at a distance of six to ten inches, till the gum becomes white ; then perform the operation quickly.

It follows from what has been said that ethyl chloride is of less value for local anæsthetic purposes at the back of the mouth, where it is difficult to apply, or where there is a copious flow of saliva. It is of little use in extracting multiple-rooted teeth.

**Note.** It is not safe to employ intense cold for anæsthetic purposes in the case of aged persons, or those with a defective circulation, as **gangrene** of the part (practically "frost-bite") has been known to result, causing ultimate death of the patient.

Neither should it be employed for the extraction of very septic roots with much inflammation, as the lowering of the vitality of the part which results may cause increased activity subsequently on the part of the micro-organisms, and extensive sloughing be the result.

The vapour of ethyl chloride is **inflammable**, and must not be employed near a lighted lamp or other flame.

**GENERAL ANÆSTHETIC.** Ethyl chloride has been used, under the name of **Kelene**, for general anæsthesia. See p. 185.



## SIALAGOGUES, ANTI-SIALAGOGUES, AND DEMULCENTS.

**Sialagogue** (*σίαλος*, saliva, ἄγω, I lead). That which causes a flow of saliva.

**Anti-sialagogue.** That which diminishes or arrests the flow of saliva.

**Demulcent** (*demulcere*, to soothe). A substitute for the natural secretions of the mouth.

A normal healthy secretion of saliva is essential to the hygiene of the mouth and the preservation of the teeth, and when prescribing mouth-washes this should not be forgotten.

The quantity and quality of the saliva is a matter so correlated with the general health of the patient that we consider it unwise for a dentist to prescribe remedies, beyond simple local applications, for its regulation, unless he is fully cognisant of all the circumstances, and is competent to deal with general diseases.

On the other hand, it is necessary for the dentist to be acquainted with the effects of drugs on the secretion of the mouth.

The flow of saliva is :—

1. **Increased** by aromatic oils, bitters, aromatic bitters, spirits, chloroform, pungent bodies, sweet substances, acid or sour substances, and also such drugs as jaborandi, tobacco, mercury, iodine, antimony, and ipecacuanha.

2. **Diminished** by insipid or nauseous bodies, dilute alkaline or soapy substances, and by belladonna

(atropine), tobacco (in excess), and opium. And also by depressing nervous influences.

Apart from the secretions of the mouth there are its **excretions**, which, in disease, may give rise to bad odour. *Mercury* and *iodine* are excreted from the mucous membrane, and may cause trouble.

## **Pyrethri Radix.** PELLITORY ROOT.

### **Materia Medica.**

*Source.* The dried root of *Anacyclus pyrethrum*.

*Preparations.*

*Tinctura Pyrethri*, 1 in 5. Dose.  $\frac{1}{2}$  to 1 dr.

### **Pharmacology and Therapeutics.**

Pellitory causes a sharp, burning sensation in the mouth, followed by tingling and numbness and a profuse flow of saliva. It is useful as a stimulating application to passively congested gums and to give a "clean" taste to dentifrices. As a stimulant aseptic mouth-wash the following is useful:—

Rx.

<i>Tincturae Pyrethri</i>	3	i.
<i>Tincturae Tolutani</i>	$\frac{3}{4}$	ss.
<i>Aquam Destillatam</i>	ad	$\frac{3}{4}$ iv.

Misce. Fiat collutorium.

Signa. The concentrated mouth-wash.

Add sufficient water to give a sharp taste.

## **Aromatic Oils.** see p. 99.

The aromatic oils have a stimulating action on the mucous membrane and especially on the nerves of taste, and cause a reflex stimulation of the salivary and mucous glands and a natural flow of saliva and mucus.



**Belladonna.** See p. 97.

**Sulphate of Atropine.** See p. 97.

**Pharmacology.**

Belladonna or atropine administered internally will arrest the flow of saliva and cause dryness of the mouth ; but inasmuch as they also arrest other secretions, and are powerful poisons, their use for such purposes is inadvisable.

**Therapeutics.**

$\frac{1}{100}$  gr. of *atropine sulphate*, dissolved in a few drops of water and applied to the gum by means of a wad of blotting paper, will locally arrest the secretions from that portion of the gum in a little while, and is sometimes of use when inserting cement fillings without the use of the rubber dam.

**Opium.** See p. 170.

**Pharmacology.**

Opium or morphia taken internally **ARRESTS THE SECRETION** of saliva by its specific action. It is also readily absorbed by the mucous membrane of the mouth, and exerts a marked local action, so that the mouth becomes dry, the tongue foul, and there is a thickness of voice and thirst.

**Glycerinum.** GLYCERINE.  $C_3H_5(OH)_3$ .

*Dose.* 1 to 2 drs.

*Preparations.*

<b>Glycerinum Acidi Carbolici</b>	(of glycerine)	5	in	6
"	" <b>Tannici</b>	"	5	" 6
"	<b>Boracis</b>	"	6	" 7
<b>Glyceritum Boroglycerini</b>	"	2	" 3	
(U.S.P.)				

*Solubility.*

Freely in water or alcohol.

Insoluble in ether, chloroform, or oils.

**Pharmacology.**

Glycerine is slightly STIMULANT, ANTISEPTIC, and HYGROSCOPIC, and imparts a smooth, SWEET TASTE to astringent mixtures. It is readily absorbed by the unbroken skin, and will carry in with it substances dissolved.

**Therapeutics.**

Acts as a DEMULCENT when diluted with water, 1 in 3. It is the antidote to the local caustic action of carbolic acid by dissolving out and diluting it.

**Tragacantha.****Materia Medica.**

*Source.* A gummy exudation collected from *Astragalus gummifer*.

*Characters.* White or yellowish, inodorous, nearly tasteless flakes.

*Composition.* Tragacanth consists of two gums:

**Bassorin** (33%), comparatively insoluble in water and unfermentable, and a gum nearly identical with the arabin of acacia (53%).



*Solubility.* Very sparingly soluble in cold water.

*Preparations.*

***Glycerinum Tragacanthae.***

Tragacanth, 3; Glycerine, 12; Water, 2.

***Mucilago Tragacanthae,*** 1 in 80 of water  
(with the aid of rectified spirit).

**Pharmacology and Therapeutics.**

Gum tragacanth, when moistened, swells up into a glutinous mass, which is only slightly soluble, and so forms a non-irritant, PROTECTIVE COATING, which is very useful and comforting in raw conditions of the mucous membranes. **Example.** Red glazed tongue.

R.

<i>Tragacanthae</i>	$\bar{\zeta}$ j.
<i>Olei Amygdalae</i>	m x.
<i>Aquam</i>	ad $\bar{\zeta}$ ii.

Misce. Fiat mistura.

Signa. The application.

A teaspoonful to be spread over the gums and tongue.

**Note.** *Mercury* and *iodine* are excreted by the mucous membrane of the mouth, and are apt to set up irritation and inflammation. Should particularly septic conditions be present, as around collections of tartar on the lower incisors, this inflammation will probably run on to ulceration and necrosis. Hence it is very important that the mouths of patients taking these drugs should be kept scrupulously clean, in which case little harm is likely to happen.

## COLOURING, PERFUMING, AND FLAVOURING DRUGS.

The rendering of prescriptions as pleasant as possible to sight, smell, and taste is a minor but important part of the art of prescribing.

Patients are more apt to use a remedy, and more regularly, if it is made agreeable.

After operations about the mouth, especially scaling, some pleasant and refreshing lotion is very grateful to the patient.

Demulcents should not be used to hide the taste of antiseptics, as they also hinder the action of the latter. It is also undesirable to employ acidly fermentable or acid bodies in the mouth.

The age and tastes of patients should be considered—*e.g.*, sweet substances are more suitable for children and women, and aromatic preparations for men.

The other ingredients of a mixture must also be considered both as to flavour, &c., and also as to miscibility.

### Colouring.

For colouring watery or alcoholic liquids.

*Tr. Persionis* (non-official). 12½% in alcohol (30%).  
Use 2m. to 1 ʒ.

*Tr. Krameria*. See p. 46. Use 10m. to 1 ʒ.

Both give a red colour and are miscible with alcohol and water. The *Tr. Krameria* has an astringent flavour.



**Tr. Croci** (B.P. (1885) AND U.S.P.). 10% in alcohol (50%). Use 2m. to 1 ℥.

Prepared from dried stigmata and tops of the styles of *Crocus sativus*. Gives a yellow colour and contains a volatile oil. It has a strong aromatic odour and bitter aromatic taste.

For powders.

**Carmines** (non-official).

A precipitate from decoction of *cochineal* (off.) by alum, soluble in alkalies and alcohol; gives a red colour.

For imparting a sweet taste.

**Glycerinum** (see p. 108) may be employed as the solvent for such drugs as boracic acid, tannin, &c., though it is not strong enough to counteract the drawing sensation of the last-mentioned drug.

**Glusidum** (saccharin) may be added to mixtures or dentrifices. It is only slightly soluble in water (1 in 410), but much more soluble in alcohol (1 in 30), glycerine (1 in 50), and dilute alkalies. May be employed in the strength of  $\frac{1}{2}$ –1 gr. to ℥ iv.

**Syrupus** (sugar) and **Mel.** (honey) are open to the objection that they are acidly fermentable.

For imparting a sweet odorous flavour.

**Oleum Rosae.** Use 1 m to 1 ℥.

**Aqua Rosae.** Ad libitum.

**Oleum Rosmarini.** Use 1 m to 1 ℥.

**Oleum Lavandulae Florum.** Use 1 m to 1 ℥.

**Spiritus** " " Use 16 m to 1 ℥.

**Oleum Amygdalae Essent.** Use 1 m to 1 ℥.

**Aqua Sambuci** (*Elder-flowerwater*). Ad libitum.

**Syr. Aurantii.**

As aromatic flavours,

*Aqua Aurantii Florum.* Use ad libitum.

*Oleum Limonis.* Use 1 m to 1 ̄.

*Oleum Bergamotae.* "

*Menthol.* Use 1 gr. to 1 ̄.

*Ol. Gaultheriae (Oil of winter green).* Use  
1 m to 1 ̄.

*Syr. Zingiberis and Tr. Zingiberis.* Use 10 m  
to 1 ̄.

*Ol. Myristicae (Oil of nutmeg).* Use 1 m to 1 ̄.

*Sp. Myristicae.* Use 10 m to 1 ̄.

*Oleum Carui.* Use 1 m to 1 ̄.

*Ol. Caryophyllum (Oil of cloves).* Use 1 m to 1 ̄.

*Oleum Cinnamomi.* Use 1 m to 1 ̄.

*Aqua* ,, Use ad libitum.

*Spiritus* ,, Use 10 m to 1 ̄.

*Oleum Coriandri.* Use 1 m to 1 ̄.

*Aqua Menthae Piperitae (Peppermint water).*  
Use ad libitum.

*Oleum Menthae Piperitae.* Use 1 m to 1 ̄.

*Sp. Menthae Piperitae.* Use 10 m to 1 ̄.

*Alcohol imparts a warm taste.*

*Aqua Chloroformi.* Use ad libitum.

*Sp.* ,, Use 10 m to 1 ̄.

*Tr. Myrrhae.* Use 20 m to 1 ̄

*Balsamum Tolutanum.*

*Tinctura Tolutani.* Use 10 m to 1 ̄.

—are available.



## As Perfumes,

<i>Aqua Rosae.</i>			Use ad libitum.
<i>Oleum Rosae.</i>			Use 1 m to 1 $\frac{z}{3}$ .
<i>Oleum Rosmarini.</i>			"
<i>Oleum Eucalypti.</i>			"
<i>Eau de Cologne.</i>			Use 10 m to 1 $\frac{z}{3}$ .
<i>Aqua Sambuci</i> (Elder-flower).			Use ad libitum.
<i>Aqua Lavandulae Florum</i> (Lavender Water).			Use 10 m to 1 $\frac{z}{3}$ .
<i>Oleum Lavandulae Florum.</i>			Use 1 m to 1 $\frac{z}{3}$ .
<i>Sp.</i>	"	"	Use 10 m to 1 $\frac{z}{3}$ .
<i>Tr.</i>	"	"	Use 10 m to 1 $\frac{z}{3}$ .
—are very useful.			

*Coumarin*, especially in combination with *Otto of Roses*, has the power of hiding the smell of iodoform. One part of each to 98 of iodoform.

## DRUGS EMPLOYED IN THE MOUTH FOR THEIR MECHANICAL EFFECTS.

Certain official and non-official drugs are employed in the mouth by the dentist, not for their action on tissues, but as DETERGENTS (cleaning agents; *detergeo*, I wipe away), PROTECTIVES, SOLVENTS, or DEHYDRATORS.

### Calcii Carbonas Precipitata. PRECIPITATED CALCIUM CARBONATE. $\text{CaCO}_3$ .

*Synonym.* Precipitated Chalk.

*Dose.* 10 to 60 grs.

Forms the base of most DENTIFRICES. Is slightly antacid and astringent. From its insolubility is likely to remain long if brushed into crevices, and so form a nidus for collection of calculus, or irritate the gums. It is not likely to abrade the teeth if used in small quantities and with care.

### Os Sepiae. POWDERED CUTTLE-FISH. Not official.

Sometimes added in small quantities to dentifrices from which a more thorough scouring action is required. Its use is as a rule best avoided as likely to abrade the enamel.



**Potassii Hydras.**

*Preparation.* **Liquor Potassae** (27 grs. to 1 oz.).

**Liquor Potassae** is a useful ingredient for a mouth-wash. It has a SOLVENT action on epithelial débris, inspissated mucus, and old blood-clot; is also antacid. See p. 85. Has a disagreeable soapy taste and feel.

**Sapo Durus.** HARD SOAP.

*Synonym.* Sodium oleate.

From its CLEANSING action is a useful ingredient of tooth powders, to form 15 to 20 per cent. by weight of the total, or may be used alone. Soaps may be classified as: 1, superfatted; 2, alkaline; according as to whether the fatty constituents predominate or some free alkali is present. The latter variety is the best for the purpose above mentioned. "Castile" soap (sapo Hispaniensis), which is made with olive oil, is more pleasant than ordinary varieties, as having less taste.

**Mastiche.** MASTIC. No longer official.

*Source.* A resin obtained from *Pistacia lentiscus*.

*Solubility.* Insoluble in water.  
Partly soluble in alcohol (90%).  
2 in 1 of ether.  
2 „ 1 „, chloroform.

A solution of mastic is much employed in dentistry, applied on cotton-wool as a temporary PROTECTIVE filling. By evaporation of the solvent and precipi-

tation of the resin by the saliva a hard mass results which will endure for several days.

Mastic solution may be used to coat "osteoplastic" fillings and protect them from moisture while setting. It should then be dried on with hot air. Mastic was formerly much used for cementing in pin crowns.

A useful formula for solutions is as follows :—

Take of mastic, 2 ounces.

      " alcohol, 1 ounce.

Dissolve and decant after a few days.

Gum *sandarac*, *copal*, and *dammar* are often used instead of mastic. Their action is the same, though sandarac is said to have the least taste. Copal must be dissolved in ether, and hence is more difficult to keep.

### **Paraffinum Durum.** HARD PARAFFIN.

*Synonym.* Paraffin wax.

### **Paraffinum Molle.** SOFT PARAFFIN.

*Synonym.* Vaseline.

Hard paraffin forms a most efficient PROTECTIVE for cement fillings while the latter are hardening.

It may be dissolved in xylol and the solution painted on, the solvent then being evaporated ; or a small piece, being placed in contact with the filling, may be melted and spread over the surface by the hot air blast.

Soft paraffin (vaseline) is less effective for this purpose ; it is, however, a useful protective to tissues surrounding a spot to which it is desired to apply a mineral acid, also for cracked lips and sore places around the mouth causing trouble during operation.



Vaseline is often used as a base for ointments, but is *not* absorbed, so should not be used where the incorporated drug is required to penetrate.

It is also used as a coating for impression materials.

### **Collodium. COLLODION.**

*Composition.* Pyroxylin 1, dissolved in ether, 36, and alcohol, 12.

*Preparation.* *Collodium flexile* (collodion 48, Canada balsam 2, castor oil, 1).

Collodion may be used for similar PROTECTIVE purposes, as described under paraffin. *Flexile collodion* does not crack, as does collodion. They are both highly inflammable.

### **Tragacantha. See p. 109.**

Powdered tragacanth, from its property of forming a sticky paste with water, is useful for securing adhesion of upper artificial "suction" plates for the first day or two after insertion, until perfect co-adaptation to the mouth is secured.

Tragacanth may be used to suspend or emulsify drugs difficult of solution in water.

**Example.**—Turpentine, magnesia.

### **Gossypium. COTTON.**

*Synonym.* Cotton-wool.

*Source.* The hairs covering the seeds of *Gossypium barbadense*, from which the fatty matter has been removed.

This is called "absorbent cotton-wool," in contradistinction to ordinary "non-absorbent cotton-wool," which contains 10% of fixed oil. "Non-absorbent" cotton may be used as a root filling, and is less likely to collect septic matter than the "absorbent." Cotton is used to make *pyroxylin*. Its other uses are well known, and need not be described here.

**Alcohol Absolutum.** See p. 147.

From its readily combining with water, is employed to remove the last trace of moisture from roots and cavities before filling. For this purpose the alcohol must be freely used, then removed by mopping, and the last traces by hot air.

*Note.* In live teeth the evaporation of the drug often causes severe pain from the cold produced.

**Chloroformum.** See p. 183.

A useful SOLVENT of gutta-percha. Used to smooth gutta-percha fillings (though open to the objection that it is apt to make the surface porous), and for introduction into the roots of teeth before filling with gutta-percha points to secure perfect adaptation. A solution of gutta-percha in chloroform (chloro-percha) may be used for the latter purpose.

**Oleum Cajuputi.** OIL OF CAJUPUT.

*Source.* The oil from the leaves of *Melaleuca leucodendron*.



**Pharmacology and Therapeutics.**

Is one of the group of *aromatic oils*, and has similar properties to oil of cloves (see p. 99). Is a *solvent* of gutta-percha, and is used for the same purpose as chloroform. Its antiseptic action makes it appropriate for root treatment; also, as the merest trace, to secure adhesion of gutta-percha fillings.

**Oleum Eucalypti.** See p. 81.

As a SOLVENT of gutta-percha, with antiseptic action (see above).

**Alum.** See p. 36.

A saturated solution of alum, coloured by the addition of a little cochineal, is very useful for hastening the setting of plaster of Paris. It may be used either at full strength or diluted, as occasion may demand.

Alum not only hastens the setting of plaster, but also prevents its expansion and hardens the cast.

## BLEACHING AGENTS.

Sound enamel of teeth cannot be stained interstitially, and green stains, tobacco stains, and such like can be removed by mechanical means, or iodine followed by ammonia.

Caries of the enamel, especially if slow and intermittent, renders the enamel porous and brownish. This brownish appearance is probably due to the altered refractive properties of the enamel, and cannot be removed by bleaching.

Dentine is readily stained, and the enamel being translucent, the stain will show through.

The staining of dentine may be caused by :—

1. Contamination from the mouth, such as tobacco, tannin, port wine, iron.
2. Chromogenic bacteria.
3. Metallic stains, as from amalgams, silver nitrate, copper sulphate, nickel posts, or the effect of drugs on steel instruments or gold fillings.
4. Drugs used in treating teeth, such as iodine, essential oils, creosote, aristol, beta-naphthol, tannin.
5. Hæmoglobin and its derivatives.

The first step in bleaching a tooth is to remove all the softened dentine and cleanse the pulp cavity. This will remove the greater part of the stain in most cases, and by a little sacrifice of sound stained dentine the tooth may usually be restored to its normal colour. This applies particularly to the first two causes of staining, which are also the most common in young subjects.

Metallic stains are much more difficult to deal



with. The chlorine method, followed by hot distilled water, is at times of use.

It is said that solutions of cyanide of potassium, a most dangerously poisonous drug, will remove silver nitrate stains ; it must not be used in the mouth.

Solutions of iodine and the iodides administered internally have the power of dissolving out metallic compounds from the tissues, and rendering them soluble. This method may be employed for the treatment of the lead line on the gums, and iodine may be used for local application, followed by solutions of ammonia or sodium hyposulphite for treating the metallic stains in teeth. The Authors cannot say how far this action is of practical service.

Oxidising agents appear to be the most effective in bleaching the organic drug stains. Ammonia will remove iodine stains.

The stains in teeth produced by death or hyperæmia of the pulp are due to the deposit of hæmoglobin in the dentine ; this after a while, from its own metabolic changes, becomes reduced hæmoglobin and shows through as more or less black.

The application of any oxidising agent will reoxidise this, if still fresh, and produce a pink discoloration in place of the black.

In course of time other derivatives of hæmoglobin are formed, and the pink becomes a yellow stain.

Eventually the iron may become separated from its proteid combination and united with other elements, such as sulphur formed from the decomposition of fibrils, and so produce grey colours.

The admission of air and bacteria to a dead and degenerated pulp will sometimes lead to a rapid discoloration of the tooth.

The numerous methods of bleaching teeth all depend on the action of either :—

- |                    |                   |
|--------------------|-------------------|
| 1. Oxygen          | O.                |
| 2. Sulphur dioxide | SO <sub>2</sub> . |
| 3. Chlorine        | Cl.               |
| or 4. Iodine       | I.                |



The first three are able to form new colourless compounds with many pigments, and the last acts by rendering the stain soluble; after which it may be removed, or decolourised by ammonia if necessary.

Bleaching agents depending on the use or formation of acids appear to us apt to do more harm than good, and their use should be avoided when possible.

The rubber dam should always be applied and only the one tooth exposed, so that no other teeth or tissues may suffer from the possible ill-effects of the drugs used.

After any of these methods have rendered the tooth white, it should be at once filled with a white filling, such as zinc-oxychloride or zinc-oxyphosphate, and this eventually covered with a hard filling.

## Oxygen.

Various means of applying oxygen to the dentine have been suggested.

1. Liquor Hydrogenii Peroxidi.
2. Sodium Peroxide, followed by dilute solutions of sulphuric, hydrochloric, or trichloroacetic acids.
3. Pyrozone, 25%.
4. Benzozone in a supersaturated solution.

Oxygen acts by uniting with the stain, and so producing a new and colourless compound.

The principal difficulty in bleaching with oxygen is to get the oxygen to penetrate the dentine. The tooth has to be first thoroughly cleansed and the apical portion of the root filled, after which the drug chosen is applied freely and if necessary sealed in for some time.



**Liquor Hydrogenii Peroxidi.** See p. 69.

Will liberate nine volumes of oxygen for each volume used, but soon becomes exhausted, so that dressings of it are of little use. No after-treatment is necessary, as the waste product is only water. The presence of *aluminium chloride* increases the rate of liberation of oxygen.

**Sodii Peroxidi.** See p. 70.

Can be used in stronger solutions, hence it is a more powerful agent. Also the product of decomposition is not water, but caustic soda, which is a solvent of fatty material and even of cells also, thus increasing its penetrating and cleansing power. Warm water is much preferable to acids for removing the resulting caustic soda. It is employed as a saturated solution on asbestos fibre, as it dissolves cotton-wool. Sodium peroxide is a powerful, penetrating caustic.

**Pyrozone.** Non-official.

Is a solution of hydrogen peroxide in water (3% solution), or ether (5% or 25% solutions). It is mainly this last which is used for bleaching. The oxygen is said to be given off slower, and so dressings may be sealed in the cavity and left. The addition of an **alkali** seems to increase the activity of this preparation, or the oxygen may be made to penetrate further by **cataphoresis**, in which case use an aqueous solution of 25% pyrozone, made by shaking together equal quantities of water and 25% pyrozone and evaporating the ether, and add 1% of zinc sulphate to reduce the electric resistance and also render the bleaching more permanent. Pyrozone is caustic.

**Benzozone.** BENZOYL-ACETYL-PEROXIDE.  
 $C_6H_5COO_2COCH_3$ . Non-official.

An organic compound of the peroxide class, it is only slightly soluble (less than 1%), and does not act so vigorously but for a longer time than the other peroxides. It produces an acid reaction, but not a very strong one.

### Sulphur Dioxide.

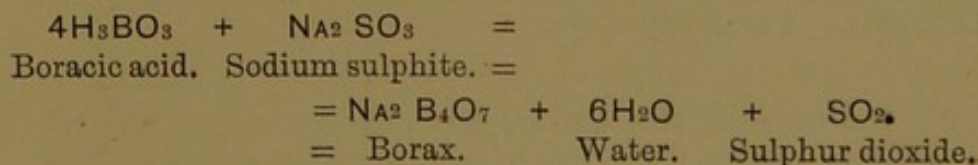
Sulphur dioxide is able to combine with pigments and form a colourless compound.

It is usually produced by filling the cleansed cavity with a mixture of sulphite of soda and boracic acid, then moistening the mixture and sealing it in; when sulphur dioxide will be produced and bleach the tissues. There will be a certain amount of acid reaction.

**Sodii Sulphis.** SULPHITE OF SODA.  $Na_2 SO_3, 7H_2 O$ .  
 Non-official.

*Dose.* 15 to 60 grs.

*Characters.* A white crystalline salt, which readily decomposes into the sulphate if exposed to the air. Sulphur dioxide is produced by packing the cavity with a mixture composed of 100 grs. of *sodium sulphite* and 70 grs. of *boracic acid*, mixed quite dry, and then adding water to bring them into solution.

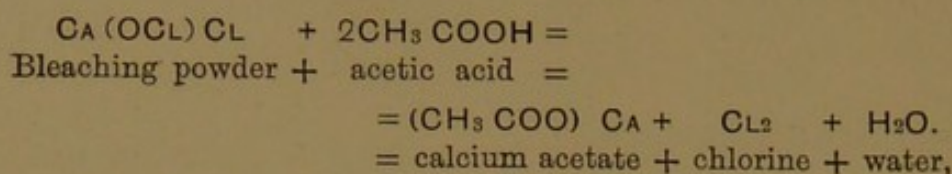




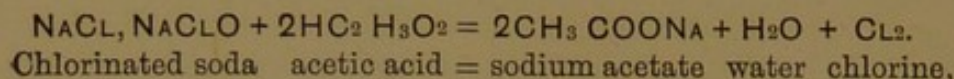
**Chlorum.** See p. 42.

*Incompatible* with gold and amalgam fillings.

Many ways of producing chlorine have been introduced, such as the use of *calcium hypochlorite* and any acid, *e.g.*, *Acetic*.



or *Liquor Sodae Chlorinatae* and an acid.



or the *free gas* as applied to the tooth by a special apparatus, or chlorine water swabbed in.

Chlorine is capable of uniting with pigments and forming a colourless salt, or of uniting with the hydrogen of water, and liberating nascent oxygen, thus acting either directly or indirectly on the stain.

The chlorine compound selected is packed into the cavity, and then the chlorine is liberated by the action of some dilute acid—which, does not matter much—and the cavity sealed up.

The objections to the use of chlorine are that it involves either the use of acids to liberate the gas, or the formation of hydrochloric acid as a result; and as the chloride of the stain remains in the tooth, and is liable to reduction, the staining may, and sometimes does, return.

**Iodum.** See p. 29.

Iodine and the iodides have the power of forming soluble salts with some of the metals, such as silver,

mercury, copper, and iron, which can then be washed out of the tissues by suitable media.

Iodine has thus been used to dissolve the stains of silver nitrate, which are then washed away with solutions of *ammonia*. A similar plan can be adopted with the "green stain" on teeth. The internal administration of the iodides will remove in time the "blue line" produced in lead poisoning.



## PART II.

## PURGATIVES.

Medicines which cause an increased action of the bowels.

Other means than the administration of drugs by the mouth are at the disposal of the physician for obtaining evacuation of the bowels. **Enemata** (clysters), or liquids injected into the rectum, from their action in directly stimulating the muscular coat and thus promoting peristalsis, are frequently of service, especially when it is desired to act upon the lower part only. A good form of laxative enema is  $\frac{1}{4}$  to 1 pint of warm soapy water thrown in with a suitable syringe; or a drachm of glycerine may be employed, which, from its attraction of water, increases osmosis and intestinal secretion.

In chronic constipation, a suitable diet, regular exercise, and abdominal massage are of the greatest service.

Purgative drugs are classified as follows :—

1. LAXATIVES. Substances which increase the action of the bowels moderately by stimulating the muscular coat, thus augmenting peristaltic action.

**Example.** — *Whole - meal bread, figs, manna, sulphur; magnesia, and castor oil* in small doses.

2. SIMPLE PURGATIVES increase peristalsis actively and also increase glandular secretion; they may cause griping and some irritation.

**Examples.** — *Aloes, cascara sagrada, senna, rhubarb; magnesia, and castor oil* in full doses.

**3. DRASTIC PURGATIVES OR CATHARTICS.**

Greatly increase secretion and peristaltic movements, and if given in large doses cause severe griping pain, profuse diarrhœa, catarrh of the mucous membrane, secretion of mucus, and even hæmorrhage from the bowels; frequently much prostration and collapse.

**Examples.**—*Colocynth, jalap, elaterium, croton oil.*

**4. SALINE PURGATIVES.** These greatly increase the secretion of intestinal fluid, which accumulates in the bowel till peristalsis is excited, when an easy evacuation is produced. How saline purgatives act is not quite clear, but it has been ascribed to a disturbance of the process of osmosis in the intestinal wall, and in part to some specific action of the salts upon the structure of the latter.

**Examples.**—*Magnesium sulphate, sodium citrotartrate, potassium sulphate.*

**v. Hydragogue Purgatives.**—Purgatives are called hydragogue when they cause a large amount of watery secretion. They include the most active of the drastic and saline groups.

**vi. Cholagogue Purgatives.**—Purgatives are so named when their action is accompanied by an increased secretion and evacuation of bile. They may act either (a) directly on the liver cells (direct cholagogues),

**Example.**—*Podophyllin,*

or (b) by stimulating the duodenum and upper part of the jejunum, and thus sweeping on the bile before it can be re-absorbed (indirect cholagogues).

**Example.**—*Calomel.*



Purgatives are employed in general medical practice in the treatment of many diseases, and for purposes too numerous to be specified here. For the dentist their chief use is as an auxiliary measure in the treatment of acute inflammatory disturbance in its early stage.

**Example.**—Acute periodontitis, acute gingivitis.

In all acute inflammations the clearing out of the bowels is an important preliminary therapeutic measure to be adopted, *except* in acute inflammatory abdominal affections, when, as a rule, purgatives are best avoided. This treatment is directed partly to the constitutional disturbances to which the acute inflammation gives rise, and partly to the local condition, on which, indeed, the general state reacts.

The rationale is as follows :—

i. By purgation elimination of noxious products of inflammation is assisted, the intestinal tract being an important channel for the elimination of such products from the blood.

ii. Purgation, by causing dilation of the vessels of the alimentary canal, reduces blood pressure in other parts ; and if “hydragogues” be employed the volume of circulating fluid may be diminished.

iii. The body temperature, elevated in acute inflammations, and the elevation aggravated by constipation, is frequently reduced.

iv. Digestion is improved and assimilation of food favoured.

For acute inflammations occurring in dental practice the most suitable of the groups described above are the simple purgatives and the salines. Many of the latter have the additional advantage of possessing some diuretic and diaphoretic action in addition, and thus assisting in the elimination of morbid products. A mercurial purge (calomel), followed by a saline, is frequently of great utility, though, be it remembered, that, from idiosyncrasy, some persons are unable to take mercurials in any form.



**Other Uses.**

It is advisable, as a routine practice, to clear out the bowels, by means of a mild purge or enema, before administration of a general anæsthetic, especially where the patient is to be kept under for any length of time, as in chloroform and other narcosis. Neglect of this precaution may lead to an evacuation during the operation.

Purgatives are usefully employed in the treatment of convulsions due to teething; in the treatment of chronic constipation, which aggravates such morbid conditions of the mouth as are met with in pyorrhoea alveolaris; in the treatment of neuralgic affections, and in treating chronic dyspepsia and anæmia, diseases very destructive to the teeth. These conditions are, however, as a rule, best left to the care of the medical practitioner.

By the too frequent use of purgative drugs atony (weakening of normal movements and secretion) of the bowels is likely to result.

Purgative drugs being very numerous, a few of the most useful only are dealt with in the following.

**Oleum Ricini. CASTOR OIL.****Materia Medica.**

*Source.* The oil expressed from the seeds of *Ricinus communis*.

*Dose.* 1 to 8 drs.

*Characters.* Viscid, colourless, or pale yellow; odour faint, characteristic; taste slight, unpleasant.

*Solubility.* 1 in 5 alcohol.



*Preparation. Mistura Olei Ricini.* (B.P.)

Castor oil, 3 oz.; orange flower water, 1 oz.;  
mucilage of acacia,  $1\frac{1}{2}$  oz.; cinnamon water,  $2\frac{1}{2}$  oz.;  
strength, 3 drs. castor oil in 1 oz.

Dose. 1 to 2 oz.

## Pharmacology and Therapeutics.

Locally is a sedative and protective, like almond oil.

Taken internally is a LAXATIVE, or SIMPLE PURGATIVE, according to the dose. Produces an action of the bowels in from four to six hours. Castor oil is the best of the simple purgatives, as it causes no griping or subsequent constipation. The only objection to its use is the nauseous smell and unpleasant taste. The latter is much less conspicuous in the "cold drawn" variety, and may be concealed by the addition of peppermint water and a little brandy, the draught being prepared so that the oil forms a "middle layer." Or the official mixture may be given.

**Senna.** The dried leaves of *Cassia augustifolia* and *Cassia acutifolia*.

*Preparations. Mistura Sennae Composita*  
(Black draught).

Sulphate of magnesia 5 oz., extract of liquorice 1 fl. oz., aromatic spirit of ammonia 1 fl. oz., compound tinct. of cardamons 2 fl. oz., infusion of senna to 20 fl. oz.

Dose. 1 to 2 fl. oz.

*Infusum Sennae Compositus.* (U.S.P.)*Pulvis Glycyrrhizae Compositus*  
(Compound liquorice powder).

Senna 2, liquorice root 2, fennel 1, sublimed sulphur 1, sugar 6.

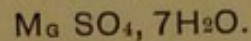
Dose. 1 to 2 drs.

**Pharmacology.**

Senna is one of the most useful of simple vegetable purgatives, stimulating the muscular coat of the bowels and producing brisk peristalsis and purgation in about five hours. It has a strong tendency to gripe if given alone, and is consequently always combined with some "carminative" as a corrective to check this effect, as in the B.P. preparations given above.

**Therapeutics.**

*Mist. Sennae Co.* (black draught), given as a full dose (2 ounces), is a useful, smart purge for a strong adult ; its action depends more on the sulphate of magnesia that it contains (see below) than on the senna. *Compound liquorice powder* is a more pleasant preparation to take, and to be preferred for children and delicate persons ; the sublimed sulphur contained in it also has a laxative effect.

**Magnesii Sulphas. SULPHATE OF MAGNESIA.****Materia Medica.**

*Synonym.* Epsom salts.

*Dose.* 30 to 120 grs. for repeated administrations.  
 $\frac{1}{4}$  to  $\frac{1}{2}$  oz. for single administration.

*Preparation.* *Mistura Sennae Compositus.* 1oz.  
in 4 fl. oz.

**Pharmacology and Therapeutics.**

Sulphate of magnesia is the most useful of the SALINE PURGATIVES (see p. 129). It is markedly "HYDRAGOGUE" in its action. May be prescribed



as the *mist. sennae co.*, or, if for repeated administrations, as the "*haustus albus*" of most hospital pharmacopœias.

R.

*Magnesii Sulphatis*                    3 j.  
*Magnesii Carbonatis*                gr. x.  
*Aquam Menth. Pip.*                ad  $\frac{3}{4}$  j.

Misce.    Fiat mistura.    Mitte doses iv.

Signa.    Two tablespoonsful every four hours.

The CARBONATE and OXIDE OF MAGNESIA act in the mouth and stomach as antacids (see p. 85). Taken internally they are decomposed by the gastric juice, and have a purgative effect similar to that of the sulphate, but not so powerful.

**Soda Tartarata.** TARTARATED SODA, SODIUM POTASSIUM TARTRATE.

*Preparation. Pulvis Sodae Tartaratae Effervescens. (Seidlitz Powder.)*

In blue paper : Tartarated soda, 120 grs.

Sodium bicarbonate, 40 grs.

(Mixed.)

In white paper : Tartaric acid, 38 grs.

*Dose.* Dissolve the powder in blue paper in half-pint of water, add contents of white paper, and drink while effervescing.

### Pharmacology and Therapeutics.

*Seidlitz Powder* is a familiar and efficient SALINE PURGATIVE. This property is mainly due to the tartarated soda contained in it, though the gas (CO<sub>2</sub>) evolved during the effervescence increases the effect by mechanically stimulating peristalsis. If taken in the morning on an empty stomach an easy action of the bowels is obtained in two or three hours.

**Hydrargyrum.** MERCURY. See p. 157.

*Preparations. Hydrargyrum cum Creta (Grey Powder).*

1 of mercury with 2 of prepared chalk.

Dose. 1 to 5 grs.

*Pilula Hydrargyri* (Blue pill).

*Massa Hydrargyri.* (U.S.P.)

Mercury 1, confection of roses  $1\frac{1}{2}$ , liquorice  $\frac{1}{2}$ .

Strength, 1 in 3 of mercury. Dose. 4 to 8 grs.

*Hydrargyri Subchloridum* (Calomel, Mercurous Chloride).

*Hydrargyri chloridum mite.* (U.S.P.)

Dose.  $\frac{1}{2}$  to 2 grs.

### Pharmacology.

Mercury and its salts are PURGATIVE, ANTISYPHILITIC, PARASITICIDE, DISINFECTANT, ASTRINGENT, DIURETIC.

PURGATIVE. The action of mercurials as purgatives is a purely local one, none of the metal being absorbed, but all expelled in the fæces. The purgative effect is produced by an irritant action of an obscure nature, increasing secretion and peristalsis chiefly on the duodenum and upper part of the jejunum. The bile is hurried onward before it can be, as ordinarily, re-absorbed; thus mercurials have an indirect cholagogue action.

### Therapeutics.

*Calomel* is a most useful purgative in cases where there is reason to suspect hepatic congestion. It is often followed by a saline (*mist. sennae co.*) to



complete the effect. Griping sometimes occurs. *Calomel* is best prescribed in the form of a pill; either alone,

R.

*Calomelanos* gr. iii.

In forma pilulae.

Nocte sumendum.

or in combination with a vegetable purgative,

R.

*Hydrargyri Subchloridum* gr. i.

*Extracti Colocynthydis Co.* gr. iii.

*Extracti Hyoscyami* gr. i.

Fiat pilula.

In the latter prescription the *hyoscyamus* is added as an adjuvant (as it increases peristaltic action) and corrective (as it relieves the griping).

*Grey powder* is useful for administering to young children, either as a purgative or antisyphilitic remedy. See p. 158.

Note. That mercurials are considered by many to have an injurious effect on developing teeth.

## TONICS.

**Tonics** are therapeutic agents which impart permanent strength to the body or its parts (Brunton). Their action is indirectly to give "tone" to the system by improving the action of one or more organs of the body.

Frequently of greater efficacy than medicines as tonic agents are fresh air, light, change of climate, baths, massage, electricity, exercise, suitable diet.

Tonic drugs may be pharmacologically classified as follows, and may act—

### 1. Through the circulatory system.

These may be sub-divided into—

- (a). Those acting on the BLOOD (hæmatinics), causing an increase in the total number of red corpuscles, and an increase in the percentage of hæmoglobin (the plasma is but little affected by drugs).

**Example.**—Iron.

- (b). Those acting on the HEART AND BLOOD VESSELS (cardiac and vascular tonics), which increase the force of the heart's contraction and overcome any tendency to vascular dilatation.

**Example.**—Digitalis.



2. Through the alimentary system. These are the gastric and intestinal tonics, and act by causing increased secretion of gastric and intestinal juices, dilating the vessels and increasing absorption, or augmenting movements. They reflexly increase the appetite for, and enjoyment of, food; and for these various reasons generally raise the standard of nutrition.

**Example.**—Vegetable bitters, mineral acids.

3. Through effect on metabolism in the tissues (alterative tonics).

So little is known exactly concerning ordinary healthy metabolism, that although this process can be certainly modified by suitable means, the precise action of drugs is obscure.

**Example.**—Arsenic.

4. Primarily through the nervous system (nervous tonics). By increasing the activity of the nervous centres, in many cases an improvement results of all the nutritive functions, through stimulation of the vaso-motor mechanism, and greater activity of heart and systemic muscles.

**Example.**—Strychnine.

5. As true foods, improving nutrition generally.

**Example.**—Cod-liver Oil.

Tonic agents are employed in conditions of debility. They thus find useful application for the treatment of patients convalescing from acute illness, suffering from prostration as the result of overwork, mental anxiety, or the shock of surgical operations. They

are frequently of great service as adjuncts in the treatment of chronic organic diseases (such as phthisis and heart disease), and as direct therapeutic agents in anaemia and chlorosis, in which hæmatinic tonics have a very marked beneficial effect. In fact, their uses in medical and surgical practice are too varied and numerous to be specified here.

It must be clearly understood, however, that tonic measures alone will not restore a debilitated patient to health while a specific cause for the debility continues to exert influence. Let it be repeated here that administration of medicines, though a measure of great value, is not the only, or always the best, therapeutic means at our disposal.

To the dentist, tonic remedies are chiefly of interest in their application to the treatment of—

1. Debility arising from conditions that he is called upon in the first place to remedy.

**Example.**—Prolonged suppuration in the mouth from stumps of teeth or pyorrhoea alveolaris.

2. Weakness arising out of shock or prostration, the result of dental operations.

**Example.**—Extraction of a number of teeth at one sitting; prolonged gold-filling operations.

3. The treatment of morbid constitutional states in children, which result in imperfect formation and delayed and difficult eruption of the teeth.

**Example.**—Rickets, marasmus.

4. In treatment of diseases favourable to production of dental caries.

**Example.**—Anæmia, dyspepsia.



5. In the treatment of various neuralgic affections which simulate those caused directly by diseases of the teeth.

The Authors of these "Notes" are of opinion that it is not as a rule desirable that the dentist who has not received a general medical training, in addition to his special one, should prescribe tonic remedies for his patients. As will be gathered from what has been said above concerning the action of tonic drugs, their various actions are so diverse in nature that considerable medical diagnostic skill is required for their efficient employment; and in unskilled hands more harm than good may result. Therefore, although, from conditions arising in dental practice, it may be clear that tonic remedies are indicated, the dentist on recognising this should refer the patient to a medical practitioner.

In the following a brief résumé is given of the pharmacology, therapeutic application, when administered internally, and toxicology of the most important member of each class of tonic drugs. Materia medica, dosage, and prescriptions are omitted.

## Iron Preparations.

### Pharmacology and Therapeutics.

Taken by the mouth, blacken the teeth and tongue owing to formation of the sulphides, though, except in acid preparations, they probably have no other ill effects (see p. 207). In the stomach they are converted into ferric chloride, and from the astringent properties of iron salts (see p. 51) are very apt to occasion derangement of digestion, though some preparations have this effect much less than others. In the intestine oxides, carbonates, sulphides, and tannate of iron are formed, and in excess are very likely to cause constipation, again from astringent.



action. Nothing is known with certainty concerning the form in which iron is absorbed, though the modern view is that such absorption certainly takes place. The great bulk is carried into the lower part of the intestine, where the epithelium and leucocytes probably absorb some in solid form and some in solution. The iron passes through the lymphatics and mesenteric glands to the blood-vessels, and is then deposited to a large extent in the spleen, and thence passes to the liver and bone marrow. When there is a deficiency of iron in the blood the liver yields up some, and excretion takes place ultimately through the cæcum and large intestine. Iron is the most valuable HÆMATINIC TONIC we possess in cases of simple anæmia and chlorosis, increasing the number of red cells in the blood and the percentage of hæmoglobin. It is also useful in combination with other tonic remedies during convalescence after long illness. Freshly prepared carbonate of iron is the best antidote in acute arsenical poisoning, an insoluble arsenite of iron being formed, which is then got rid of by a purge. (See p. 18.)

### **Digitalis and its preparations.**

#### **Pharmacology and Therapeutics.**

When administered internally are rapidly absorbed. The heart is slowed, diastole is prolonged, and the force of systolic contraction greatly increased; this is chiefly due to the direct effect of the drug on cardiac muscle. Blood pressure is raised generally by contraction of the arterioles, partly through action on their muscular coat, partly from a stimulation of the vascular centres. Digitalis also has a diuretic action.

This drug is chiefly employed in cases of cardiac disorder. It may be regarded as a true CARDIAC TONIC, as by its use in suitable cases permanent strength will accrue to the cardiac muscle. On the



vessels it will overcome the tendency to dilatation, shown by congestion and œdema of dependent parts, drowsiness in the upright, and wakefulness in the recumbent posture.

**Note.** Digitalis is a drug *never* to be administered except by a properly qualified physician, as in many cases of heart disease requiring skill for their diagnosis it is contra-indicated. The above short description is only inserted in these "Notes" for the sake of completing the classification.

**Vegetable Bitters** (of which *calumba* may be taken as a type).

**Pharmacology and Therapeutics.**

Bitters increase appetite for food, when taken internally, by stimulation of gustatory nerves; this reflexly leading to dilatation of gastric vessels, and an increase of gastric secretion. When reaching the stomach bitters are absorbed, and still further stimulate the flow of gastric juice, and peristalsis is rendered more active. They are thus ADJUVANTS TO DIGESTION and indirectly improve general nutrition. Bitters are used commonly in tonic prescriptions for the above-mentioned effects in combination with other drugs, and are of chief service in cases where some dyspepsia exists from a feebleness in function of all the bodily organs, as in anæmia, general exhaustion, and convalescence from acute disease. *Strychnine* and *quinine*, when given in small doses, owe their tonic properties largely to their action as bitters.

**Dilute Mineral Acids** (of which *dilute nitro hydrochloric acid* may be taken as a type).

**Pharmacology and Therapeutics.**

Rouse the appetite and aid digestion by increasing the salivary flow, and indirectly and reflexly that of



the gastric juice. The acidity of the contents of the stomach is increased, by which DIGESTION IS AIDED, and the increased acidity of the chyme increases peristalsis. The flow of bile is increased. Upon the intestines some dilute acids (especially sulphuric) have an astringent action. Mineral acids are employed in the treatment of dyspepsia in cases where too little acid is secreted by the stomach, also, from their cholagogue action, in cases of "hepatic" dyspepsia. Their tonic action is referable to their stimulating effect upon the gastric and biliary functions.

## **Arsenic.**

### **Pharmacology and Therapeutics.**

Arsenic preparations, taken internally in minute doses, act as gastric stimulants, dilating the vessels and causing an increased flow of secretion. In large doses they are apt to act as gastro-intestinal irritants. Arsenic is absorbed into the blood, and in some forms of anæmia acts as a hæmatinic, increasing hæmoglobin and the number of red cells. In the tissues METABOLISM IS ALTERED, though the exact influence is still obscure; possibly by lessening oxidation and tissue waste. There is no doubt, however, that an improvement in nutrition results, and arsenic is the most valuable of the "alterative" tonics.

Arsenic is used in some forms of dyspepsia, anæmia, and chronic skin diseases, as an antiperiodic in malaria, and in neuralgia having a malarial origin.

**Toxicology.** Acute. See p. 18.

**Strychnine.** See p. 150.

### **Pharmacology and Therapeutics.**

Strychnine, being intensely bitter, in the stomach acts as a "gastric" tonic in precisely the same way



as described under "bitters." In the intestine peristalsis is increased, and some purgative action may result. Being absorbed into the blood its effects are soon manifested on the NERVOUS SYSTEM. These consist in a powerful stimulation of the anterior cornua of the grey matter of the spinal cord and medullary centres (respiratory and vaso-motor). The heart is stimulated and blood pressure raised.

Strychnine is a tonic drug of great value, from its gastric and intestinal effects and as a nervous stimulant. As stated above, all the digestive functions benefit by an increased activity of the nerve centres.

### Toxicology.

A quarter of a grain has proved fatal.

#### *Symptoms of poisoning.*

Bitter taste.

Feeling of suffocation and difficulty in breathing.

Twitching of muscles, soon passing into (intermittent) tetanic convulsions of all the muscles of the body, which come on in paroxysms.

Opisthotonos and intense pain in contracted muscles.

#### *Treatment.*

Put patient under chloroform or ether.

Wash out stomach with *permanganate of potash* solution (1 in 400).

Inject 20 grains of *chloral hydrate* and 30 grains of *potassium bromide* in solution into the rectum.

### Cod-Liver Oil. OLEUM MORRHUAE.

#### Therapeutics and Pharmacology.

Cod-liver oil is liable to cause indigestion and nausea. When it can be taken it is readily absorbed,

more so than any other oil, and leads to the formation of fat. It is readily oxidised, and this may explain its value in increasing body weight, though it is supposed, in addition, to have some specific action not yet understood. It acts as a TRUE FOOD. Used in wasting diseases, general feebleness, and neuralgic affections. It may be administered with the greatest advantage in cases of rickets.



## STIMULANTS.

**Stimulants** are agents which temporarily quicken some functional or trophic process.

Their utility is manifest in tiding over times of emergency by calling into use the reserve force of the body tissues. They do not add to the strength of the body, but by drawing on the reserve force prevent a cessation of essential function for the time. As reaction follows all increased output of energy, the latter has to be paid for by subsequent exhaustion at a period of less acute urgency.

Stimulants should therefore be used sparingly, and only in cases of real need for temporary additional strength, when the subsequent exhaustion will not be dangerous.

Stimulants may be applied to any of the physiological functions. Thus they may be classified as gastric, hepatic, renal, or nerve stimulants, &c. In these "Notes" we only deal with those likely to be of use in dental practice. These are :—

### Cardiac and Cardio-vascular stimulants.

These may be either—

**DIRECT**, acting on the muscle tissue itself, such as digitalis, supra-renal extract, alcohol, ether, amyl-nitrite, artificial respiration.

**INDIRECT**—that is, through the medium of the nerves, such as strychnine, amyl-nitrite, slapping the face with a wet towel, lowering the head to increase the cerebral circulation, especially that to the cardiac centre.

**Respiratory stimulants.**

DIRECT. Artificial respiration.

INDIRECT. Those acting through the nervous mechanism—strychnine, amyl-nitrite, ammonia, cold water to the surface, lowering the patient's head. Strychnine and alcohol also have a stimulating effect on the digestive organs, which increases their general effect.

The dentist should seldom employ stimulants, their use being almost confined to hastening the recovery of patients from slight attacks of syncope. Emergencies may arise when the call for their use is immediate and imperative, so that a knowledge of the means available for the purpose is necessary.

**Example.**—In collapse from cocaine poisoning, ammonia and artificial respiration may be necessary immediately in order to prevent death.

**Alcohol. ALCOHOL.  $C_2H_5OH$ .****Materia Medica.***Solubility.*

Mixes in all proportions with water.  
Will dissolve some fats and essential oils.

**Pharmacology and Therapeutics.**

ANTISEPTIC, DEHYDRATOR, ASTRINGENT,  
STIMULANT, FOOD, ANTIPYRETIC.

STIMULANT. Alcohol in a moderate single dose is a good cardiac stimulant, acting on the cardiac



muscle directly and increasing the force of the contractions. The entire nervous system is also temporarily stimulated, but quickly depressed.

It should be given in the form of 2 oz. or 3 oz. of *brandy* or *whisky*, either pure or very slightly diluted ; it acts quickly and surely. Hence it is very useful in the treatment of shocks or syncope. It is also very useful in small doses for treating chronic diseases of the heart, and in fever.

The dentist should only give alcohol in cases where it is urgently called for and other drugs will not serve as well, as it is a drug very liable to abuse. Its use is practically confined to cases of threatened cardiac failure from shock or heart disease.

**ANTISEPTIC.** Alcohol has a weak antiseptic action.

**ASTRINGENT.** In the form of evaporating lotions alcohol produces cold, and acts as an astringent.

**FOOD.** Alcohol is, to a small extent, oxidised within the body and so contributes to general nutrition.

**ANTIPYRETIC.** Alcohol increases the cutaneous circulation and perspiration, diminishes metabolism, and, in excessive doses, causes general depression, thus reducing the body temperature.

### **Ammonia.** AMMONIA. $\text{NH}_3\text{HO}$ .

#### **Materia Medica.**

*Dose.* Not given pure except by inhalation.

*Solubility.* 1 in 3 of water.

*Preparations.*

*Liquor Ammoniae Fortior.* 1 in 3.  
Not given internally.

*Aqua Ammoniae Fortior.* (U.S.P.)  
Not given internally.

*Spiritus Ammoniae Aromaticus*  
(*Sal Volatile*). 1 in 30.  
Dose.  $\frac{1}{2}$  to 1 dr.

Contains carbonate of ammonium, strong solution of ammonia, volatile oil of nutmeg, oil of lemon, rectified spirit, water.

*Liquor Ammoniae.* 1 in 10.  
Dose. 10 to 20 mins.

*Aqua Ammoniae.* (U.S.P.)  
Dose. 10 to 20 mins.

*Ammonii Carbonas.*  
Dose. 3 to 10 grs.; 30 grs. as an emetic.

*Pharmacology.*

GENERAL STIMULANT, IRRITANT, ANTACID,  
DECOLOURISING AGENT.

STIMULANT. Ammonia stimulates the central nervous system, especially the respiratory centre; it is also a local stimulant and a stomachic carminative, both of which latter actions reflexly induce general stimulation.

IRRITANT. The vapour of ammonia, if confined to the skin or mucous membranes, under a dressing, acts as an irritant, and will quickly raise a blister. Its action is so penetrating that it is seldom used for this purpose. Solutions used in liniments also have an irritant action.

ANTACID. The antacid properties of ammonia are not employed in the mouth on account of its irritant action.

DECOLOURISING AGENT. See p. 72.



**Therapeutics.**

**STIMULANT.** It is very useful in restoring consciousness and proper respiratory activity. It may be administered by inhalation of the *vapour* itself, or given internally as **20 mins.** of the *liquor* diluted ; as **1 dr.** of *sal volatile* diluted ; or as **30 mins.** of a mixture of equal parts of *sal volatile* and *spiritus aetheris*, also well diluted. They all have the disadvantage of sometimes causing vomiting.

Ammonia is a good general stimulant, quick in its action, and indicated in sudden collapse from pain, cocaine poisoning, or nervous shock.

**IRRITANT.** When removing iodine stains from the skin with ammonia, it must be remembered that an additional irritant is being applied.

**Toxicology.**

Strong solution of ammonia given undiluted is a corrosive poison.

*Symptoms of poisoning.*

Pain in throat, stomach and larynx.

Asphyxial symptoms.

Vomiting, purging.

Collapse.

*Treatment.*

Vinegar.

Tracheotomy.

Brandy and morphia.

**Strychnina. STRYCHNINE.****Materia Medica.***Source.*

An alkaloid obtained from the seeds of *Strychnos nux vomica*.

*Solubility.*

Sparingly in water.  
1 in 150 of alcohol.

*Preparations.*

*Liquor Strychninae Hydrochloridi*, 1 in 100.

Dose. 2 to 8 mins.

Hypodermically, 2 to 3 mins.

## Pharmacology and Therapeutics.

## STIMULANT, TONIC.

STIMULANT. Strychnine is a powerful nerve stimulant, and its continued use is attended with danger on account of its tendency to accumulate in the system, leading to convulsions and death.

To the dentist it may be useful as a stimulant, administered subcutaneously (1 to 3 mins. of the *liquor*) in cases of cardiac and respiratory failure.

All the ordinary methods of resuscitation should be persevered with.

It is also the antidote to *opium* and *chloral hydrate* poisoning.

TONIC. See p. 143.

Toxicology. See p. 144.

**Æther.** See p. 181.

## Pharmacology and Therapeutics.

## GENERAL ANÆSTHETIC, STIMULANT.

STIMULANT. Ether has a similar, more rapid, but less persistent action than alcohol, and may be used in place of the latter drug. It may be given by



the mouth (60 to 90 mins. of the *spirit*), injected hypodermically (5 to 10 mins.), or hypodermically combined with strychnine (10 mins. *ether* and  $\text{m}$  iij. *liquor strychninae*).

**Amyl-Nitris.** AMYL NITRITE.  $\text{C}_5\text{H}_{11}\text{NO}_2$ .

**Materia Medica.**

*Dose.* Of vapour, 2 to 5 mins. ; internally,  $\frac{1}{2}$  to 1 min.

*Solubility.*

Readily in alcohol.

Almost insoluble in water.

*Preparations.*

Usually put up in glass capsules, wrapped in lint, containing 5 mins.

**Pharmacology.**

THE PERIPHERAL VESSELS ARE DILATED ; THE  
HEART IS GREATLY ACCELERATED.

**Therapeutics.**

Amyl-nitrite is only used by dentists in cases of threatened **cardiac failure** from the administration of anæsthetics. A capsule is broken and the patient made to inhale the vapour. Its effect is immediate, but it is necessary that the patient take an inspiration or the drug is useless.

## SPECIFICS.

**Specifics** are remedies which have a distinct effect in the cure of a special disease.

How such remedies act is only partially known.

The cure of disease may be affected by the employment of remedies concerning which we are enabled to definitely state a reason why they have this effect.

**Example.**—The cure of scabies by means of sulphur applications, this drug being known to kill the itch parasite.

This is **rational** therapeutics.

Or by using remedies whose efficacy is attested by experience *only*.

**Example.**—Mercury in syphilis.

This is **empirical** therapeutics.

Most specific drugs are used empirically, though with advancing knowledge many methods of treatment, formerly wholly empirical, are now coming into the "rational" category.

The specific drugs of most interest to the dentist are :—

1. ANTISYPHILITIC remedies. Mercury and potassium iodide.

2. ANTISCORBUTIC remedies (*scorbutus*, scurvy). Lime juice.

3. ANTISTOMATITIC remedies. Chlorate of potash, borax.



**Potassii Chloras.** CHLORATE OF POTASSIUM.  
KCLO<sub>3</sub>.

**Materia Medica.**

*Dose.* 10 to 30 grs.

*Solubility.*

1 in 16 of cold water.

1 „ 8 „ glycerine.

*Incompatibles.* Charcoal, sulphur, ferrous salts, acids, glycerine.

*Preparation.* *Trochiscus Potassii Chloratis.*

Contains 3 grs. Pot. Chlor. (U.S.P. contains 4½ grs.)

**Pharmacology.**

SPECIFIC IN ULCERATIVE STOMATITIS, ANTI-SEPTIC.

It presumably acts by liberating nascent oxygen, which is an antiseptic and a tissue stimulant.

**Therapeutics.**

Chlorate of potash used as a gargle, 10 grs. to 1 oz., or as the *lozenge*, causes rapid healing in cases of ulcerative stomatitis. It may also be given internally in 10 gr. doses for an adult, when it is excreted unchanged from the salivary glands and mucous membrane, and is thus again very useful locally.

R.

*Potassii Chloratis* ʒ iii.

*Aqua Rosae* ʒ vi.

Misce. Fiat collutorium.

Signa. The mouth-wash.

To be diluted with an equal amount of water and used frequently.

R.

*Potassii Chloratis*      3 i.  
*Syrupi Aurantii*        3 i.  
*Aquam*                    ad 3 vi.

Misc. Fiat mistura.

Signa. The mixture.

Two tablepoonsful to be taken three times a day  
after meals.

**Toxicology.**

1½ oz. have killed a man.

*Symptoms of poisoning.*

Pain in the stomach and bowels, vomiting ; collapse,  
jaundice, hæmaturia, suppression of urine.

*Treatment.*

Wash out the stomach.

**Sodii Biboras.**      BIBORATE OF SODIUM.  
                              $\text{Na}_2\text{B}_4\text{O}_7, 10\text{H}_2\text{O}$ .

**Materia Medica.**

*Synonym.* Borax.

*Dose.* 5 to 20 grs.

*Solubility.*

1 in 25 of cold water.

1 „ 1 „ glycerine.

Insoluble in alcohol.

*Preparations.*

*Glycerinum Boracis.* 1 to 6½.

*Mel Boracis.*

2 parts Borax ; 1 part Glycerine ; 16 parts Honey.



**Pharmacology.**

ANTISEPTIC, SPECIFIC FOR APHTHOUS STOMATITIS.

**Therapeutics.**

The *glycerinum boracis*, applied on a piece of lint wrapped round the nurse's finger, is a very efficacious means of cleansing the mouth in cases of **aphtous stomatitis** and thrush in infants. It is a better preparation than the *mel boracis*, as the glycerine is less liable to undergo fermentation than the honey. It is antiseptic and non-irritant, and the sweet taste of the glycerine renders it very palatable to children.

**Potassii Iodidum. POTASSIUM IODIDE. KI.****Materia Medica.**

*Dose.* 5 to 20 grs.

*Solubility.*

1 in 1 of water.  
1 „ 10 „ alcohol.  
1 „ 3 „ glycerine.

**Pharmacology.**

ACCELERATES TISSUE CHANGES, RENDERS THE BLOOD MORE COAGULABLE; SPECIFIC IN TERTIARY SYPHILIS.

ALTERATIVE. In syphilis it acts by causing the rapid resolution of gummatous collections, by liberating iodine, which stimulates cells and favours absorption of exudation and inflammatory products.

**Therapeutics.**

Chiefly as a specific in the tertiary stages of syphilis, either alone or in combination with mercury—the so-called “mixed treatment.”

Potassium iodide is also given for its effect in removing metallic poisons from the tissues, such as mercury and lead ; this is effected by the iodide forming a soluble compound with the metal, which is then readily excreted.

It is very useful in the treatment of chronic inflammations, when its stimulant and alterative properties are made use of.

Aneurisms are sometimes benefited by the use of potassium iodide, which helps to cause a formation of clot, and encourages healing in the aneurismal sac. Potassium iodide should always be given well diluted.

### Toxicology.

#### *Symptoms of poisoning. (Iodism.)*

Headache, hot skin, dryness and irritation of the throat.

Discharge from eyes and nostrils.

Occasional purging and vomiting.

#### *Treatment.*

Increase a small dose ; or substitute the sodium or ammonium salt.

### **Hydrargyrum.** See p. 135.

#### *Preparations.*

*Hydrargyrum cum Creta*, 1 in 3.

Dose. 1 to 5 grs.

*Pilula Hydrargyri.* Blue Pill. 1 to 3.

Dose. 4 to 8 grs.

*Hydrargyri Subchloridum.* See p. 135.

*Hydrargyri Perchloridum.* See p. 63.

*Liquor Hydrargyri Perchloridi.* 1 in 876.

Dose.  $\frac{1}{2}$  to 1 dr.



**Pharmacology.**

ANTISEPTIC, DISINFECTANT, PURGATIVE ;  
SPECIFIC FOR SYPHILIS.

**Therapeutics.**

As a SPECIFIC mercury is given during the primary and secondary stages of syphilis, and must be regularly administered to prevent symptoms. It is supposed to act by destroying or reducing the syphilitic virus.

During the administration of mercury it is necessary to keep the mouth very clean, for the mercury is excreted largely by the mucous membrane of the mouth, during which process it sets up irritation ; if sepsis is added to this the gums become inflamed (spongy gums).

**Limonis Succus. LEMON JUICE.****Materia Medica.**

*Source.* The freshly expressed juice of *Citrus medica*.

**Pharmacology.**

RELIEVES THIRST ; SPECIFIC FOR SCURVY.

**Therapeutics.**

Lemon juice is used in the preparation of drinks for the relief of thirst during fever. Lime juice (a similar juice) is employed as a preventive agent and a remedy for scurvy. For this purpose it is always carried on ships, where fresh food is not procurable. It acts by supplying the vegetable acids and salts which are wanting in dried and preserved food.

## **ANALGESICS. Antineuralgic Drugs, Antiperiodics.**

Analgesics (*ἀν* without, *ἄλγος* pain), strictly speaking, include all medicines which have an anodyne effect, local or general. The term may be advantageously limited to those drugs which, administered internally, relieve pain without producing a narcotic effect or a general anæsthesia.

Antiperiodics are remedies employed to arrest the return of diseases which recur periodically.

**Example.**—Quinine in malarial fever.

Hence those drugs employed to check those forms of neuralgia which manifest periodicity are included.

When a patient suffering pain seeks the aid of the dentist, the pain is practically always connected with one or more of the branches of the fifth nerve. The pain may or may not be due to dental trouble. In the former case, by suitable treatment, "*secundum artem*," the dentist can usually at once give relief and ultimately effect a cure by removal of the cause. If the latter, and no cause coming within the dentist's province can be discovered, the patient is as a rule best referred to the care of a medical man; as it must be borne in mind that neuralgia may be due to very varied morbid conditions, some of them of the gravest possible nature.

**Example.**—Pressure on nerve trunks by a malignant tumour.

The exact cause of neuralgic pain, even when dependent on dental disease, is sometimes obscure. The dental practitioner therefore should be acquainted with the action of the remedies which may give relief pending accurate diagnosis, and with the general therapeutic principles involved.



Drugs used to relieve or cure neuralgic pain (the term neuralgia being used in its broadest possible significance, as it is impossible here to enter into the pathology of the subject) are of use applied locally or given internally.

For local sedatives and local anodynes, which are often of much use, especially where actual neuritis or inflammation of nerve trunks and branches is present, see p. 89 *et seq.*

Analgesic drugs for internal administration may be divided into :—

1. Medicines which cure neuralgic pains by removing the cause.

**Example.** — Quinine in neuralgia of malarial origin.

Quinine was formerly employed empirically in malaria; it is now known to have an effect upon the plasmodium or malarial parasite.

2. Medicines which improve nutrition and the general health.

In many cases of neuralgia the patient will be found badly nourished and debilitated, this being a predisposing if not an actual cause of the nervous trouble; here a tonic plan of treatment is indicated. See p. 137 *et seq.*

Certain tonic remedies appear to be particularly efficacious in curing neuralgia, notably arsenic and cod-liver oil.

3. Remedies which exert a "specific" action.

**Example.** — Butyl - chloral hydrate has been credited with a specific action in trifacial neuralgia. Salicylates may be expected to do good in cases of rheumatic origin.

4. Drugs which are of value in relieving pain temporarily (sedatives, narcotics). These may be divided into

(a) General cerebral sedatives. See p. 169.

These must be very sparingly used, both on account

of their general depressant action and the readiness with which a habit of taking them is acquired.

- (b) Drugs having a depressant effect on certain sensory centres, but which do not otherwise influence cerebral activity.

**Example.**—The coal-tar derivatives; gelsemium.

These are of much value in affording relief in cases of neuralgic pain, though it must be remembered that they, too, have a dangerously depressant effect if given too freely.

In connection with class 4, remember that it is therapeutically wrong to treat symptoms when a removable cause is present.

## Coal-Tar Derivatives.

### Phenazonum. PHENAZONE.

#### Materia Medica.

*Synonym.* Antipyrin.

*Dose.* 5 to 20 grs.

*Solubility.*

Freely in water, alcohol, chloroform.

*Incompatibles.*

Iron salts; all preparations containing tannin; chloral hydrate, except in very dilute solutions; spirit of nitrous ether; cinchona alkaloids; hydrocyanic and nitric acids; and other drugs, with which, however, it is not likely to be prescribed in combination.



**Acetanilidum.** ACETANILIDE.**Materia Medica.**

*Synonyms.* Antifebrin, Phenylacetamide.

*Dose.* 1 to 3 grs. (suspended).

*Solubility.*

1 in 200 of cold water. (1 in 18 boiling.)

1 „ 4 „ alcohol.

Freely in chloroform and ether.

**Phenacetinum.** PHENACETINE.**Materia Medica.**

*Dose.* 5 to 10 grs. (suspended).

*Solubility.*

Very sparingly in water (1 in 1700).

1 in 20 of alcohol.

**Pharmacology.**

These drugs are powerful ANTIPYRETICS, ANALGESICS, and all DEPRESS THE HEART'S ACTION. Acetanilide and phenazone applied locally contract blood-vessels, and so have some local HÆMOSTATIC action.

ANALGESIC. The value of these drugs as analgesics appears to be due to a depressant effect upon the cerebral nerve centres. Their action is not comparable to that of the true narcotics, for it occurs as the result of doses that do not apparently influence mental activity, nor cause somnolence nor appreciable depression.

### Therapeutics.

To the dentist they are of service in neuralgic affections of the fifth nerve, of which the cause is obscure, though a dental origin of the trouble is suspected; as in cases of irritation caused by exostosis, pulp nodules, or the application of arsenic.

It must be carefully borne in mind, however, that these drugs are merely of service in relieving symptoms (usually temporary in their action in this respect), and not true remedies. Also that in large doses, or moderate doses frequently repeated, they are liable to produce toxic symptoms, from their cardiac depressant action; and patients must be cautioned against indiscriminate self-dosing, a habit unfortunately popular.

Acetanilide is that most likely to produce toxic symptoms, phenacetin the least so. Phenazone is the most certain analgesic, acetanilide the least. On the whole *phenacetin* is the drug to be preferred, and may be given in 5 gr. doses every three hours till relief is obtained. Owing to its insolubility in water (and the same applies to acetanilide), it is best prescribed in the form of powders, to be taken in a "cachet" or stirred up with water and drunk quickly.

Rx.

*Phenacetini.* gr. v.

Mitte doses iii., forma pulveris.

Signa. One to be taken every hour till relief is obtained.

Or the drug may be suspended in *mucilage of tragacanth*.

Phenazone may be prescribed in solution, remembering to avoid combining it with incompatibles.

"Antikamnia," a largely advertised proprietary drug, contains 70% *acetanilide*.



**Toxicology.**

**Acetanilide.** Death has resulted from two headache powders, containing between 4 and 10 grs. of acetanilide in each. Toxic effects have been observed as the effect of two 4 gr. doses quickly repeated.

**Phenazone.** Toxic effects have occurred after 10 grs. In Vienna 17 persons were killed by overdosing with phenazone during an epidemic of influenza.

**Phenacetin.** Poisonous symptoms have resulted from three doses of 8 grs.

*Symptoms of poisoning.*

Fainting, collapse.  
Slow respiration, irregular pulse, cyanosis.  
Vomiting, sweating, profound prostration.  
Death from cardiac paralysis.

*Treatment.*

Stimulants (alcohol, strong coffee, the latter administered per rectum if there is vomiting).

**Ether, 30 min.**, injected subcutaneously.

**Liq. Strychninae Hydrochloridi** m. iii, subcutaneously.

Warmth and friction.

Any of these drugs may produce a rash resembling that of measles or scarlet fever.

**Gelsemii Radix.** YELLOW JASMINE ROOT.**Materia Medica.***Source.*

The dried rhizome and rootlets of *Gelsemium nitidum*.

*Composition.*

Contains alkaloids, gelsemine and gelseminine.

*Preparations.*

*Tinctura Gelsemii.* 1 in 10 of alcohol 60%.

Dose. 5 to 15 mins.

*Gelsemine Hydrochloridi.* Not official.

Dose.  $\frac{1}{200}$  to  $\frac{1}{20}$  gr.

*Pharmacology.*

## ANALGESIC, FEBRIFUGE (P).

ANALGESIC. Gelsemium is a powerful depressant of the central nervous system, especially of the anterior cornua of the cord, and in poisonous doses causes muscular paralysis. The sensory centres are also depressed, though to a less extent, and to this action the analgesic properties of the drug are probably due. As in the case of the coal-tar derivatives, the higher cerebral centres are unaffected, and no narcotic effects result.

*Therapeutics.*

Jasmine is not a drug to be often prescribed, owing to uncertain action and poisonous properties. A fairly safe method of administration is to give 10 mins. of the *tincture* every six hours until relief is obtained. Gelsemine may be combined with other remedies, such as quinine or butyl-chloral hydrate, in the form of a pill.

R.

*Gelsemini Hydrochloridi.* gr.  $\frac{1}{200}$

*Butyl-chloral Hydratis.* gr. *iii.*

Misce et tere. Ft. pilula. Mitte *iiij.*

Signa. One to be taken every three hours till pain is relieved.



**Toxicology.**

Poisonous symptoms (paralysis of muscles) from taking 10 mins. of tincture every three hours during one day and about 80 mins. during the night.

*Symptoms of poisoning :*

Disordered vision ; diplopia ; dilated pupils.  
Weak pulse ; slow respiration.  
Unsteady gait ; paralysis of muscles.  
Asphyxia.

*Treatment.*

Wash out stomach if seen early enough.  
Stimulants.  
*Liquor Strychninae* m. iii., subcutaneously.  
Artificial respiration.

**Butyl-Chloral Hydras. BUTYL-CHLORAL  
HYDRATE.****Materia Medica.**

*Synonym.* Croton chloral.

*Dose.* 15 to 40 grs.

*Solubility.* 1 in 50 of water.  
Freely in spirit and glycerine.

**Pharmacology and Therapeutics.** HYPNOTIC, SPECIFIC IN NEURALGIA OF FIFTH NERVE. CARDIAC DEPRESSANT.

**ANALGESIC.** The pharmacological action of butyl-chloral is the same as that of chloral hydrate. See p. 172. The drug has been credited with a specific action on the nerves of the face and head,

though the most recent view is that its action is identical with chloral in all respects, except that it is less certain in its effects. May be prescribed as follows :—

R.

*Butyl-Chloral Hydratis.* gr. iij.

*Glycerinum Tragacanthae.* q.s.

Misce et tere. Fiat pilula.

Signa. One every two hours till pain is relieved.

Toxicology. As for chloral hydrate. See p. 173.

### **Sodii Salicyclas.** SALICYLATE OF SODIUM.

#### **Materia Medica.**

##### *Solubility.*

1 in 1 of water.

1 „ 6 „ alcohol.

*Dose.* 10 to 30 grs.

##### *Incompatibles.*

- Hydrobromic acid, ammonia preparations, iron salts.

ANTIPYRETIC, ANTIPERIODIC; SPECIFIC IN ACUTE RHEUMATISM. Salicylic acid is a powerful antiseptic and irritant. From their acute specific action in acute rheumatic affections, salicylates are of value in neuralgic pain of rheumatic origin, as in cases of neuritis due to cold. From the fact that they increase the nitrogenous elimination, especially that of uric acid, salicylates are sometimes serviceable in chronic rheumatic and gouty conditions, so may be given for neuralgia dependent on dental exostosis, for which these causes exist.



**Quininae Sulphas.** SULPHATE OF QUININE.**Materia Medica.***Dose.*

1 to 5 grs. as bitter.

2 to 20 grs. as antipyretic and antiperiodic.

*Source.*

An alkaloid prepared from Cinchona bark.

*Solubility.*

With difficulty in water (1 in 800).

Easily in acidulated water.

1 in 65 of alcohol.

*Incompatibles.*

Alkalies ; astringent infusions.

**Pharmacology and Therapeutics.**

ANTISEPTIC, BITTER STOMACHIC TONIC,  
ANTIPYRETIC, ANTIPERIODIC.

**ANTIPERIODIC.** Quinine while circulating in the blood is a direct poison to the organisms which are the cause of malarial fever (ague), and will both act as a prophylactic and, if the use be continued, as a cure for the disease. For paroxysmal neuralgia, which follows malaria, quinine is frequently an efficacious remedy, and may also benefit neuralgia which is not malarial in origin, though how it acts in the latter case is not clearly understood.

**BITTER STOMACHIC TONIC.** From its properties as a stomachic bitter it is frequently prescribed as a tonic remedy (see p. 142), and by improvement of the general health may be serviceable in the neuralgia of debility.

**Note.** In prescribing sulphate of quinine, 1 minim of a dilute mineral acid should be added to the mixture for every grain of the alkaloid, that the latter may be kept in solution.

## GENERAL SEDATIVES OF THE NERVOUS SYSTEM.

### Anodynes, Hypnotics.

General Anodynes (*ἄν*, without, *ὀδύνη*, pain) are drugs which, from their action on the nervous system, are employed for the relief of pain. They may be conveniently divided into—

1. NARCOTICS. Medicines which, in addition to their anodyne action, produce sleep and other symptoms of nervous depression.

General anæsthetics (see p. 175) must, strictly speaking, be included in this category.

2. ANALGESICS. See p. 159 *et seq.*

Hypnotics (*ὑπνος*, sleep) are drugs which induce sleep, with or without an additional anodyne effect.

Medicines which possess a purely hypnotic action have but little interest for the dentist, as they are chiefly employed in conditions which fall outside the scope of dental practice. They are sometimes, however, employed in combination with true anodynes.

Morbid conditions, involving severe pain, come frequently under the dental surgeon's notice, and narcotic drugs are frequently employed, legitimately and otherwise, in the symptomatic treatment of painful affections. A brief description, therefore, of the action and uses of a few of the more important



sedatives is appended. It must be strongly urged, however, that they should never be prescribed except by a qualified medical man. Apart from certain other risks attending their use, there is that of the patient acquiring "drug habits" difficult to eradicate and disastrous in results.

## Opium.

**Pharmacology.** LOCAL ANODYNE (doubtful, see p. 99) ; DIMINISHES SECRETION, CHECKS INTES-TINAL PERISTALSIS. To the nervous system STIMULANT (at first) ; ANODYNE, HYPNOTIC, NARCOTIC ; DEPRESSANT TO AFFERENT nerves ; DIAPHORETIC ; SPECIFIC IN GLYCOSURIA.

**SEDATIVE.** In moderate doses, the first effect of opium upon the nervous system is one of stimulation of the higher cerebral faculties ; there is increase of mental power and a sense of general exaltation, happiness, and well-being, attended, however, in most cases by slight inco-ordination, perversion, and extravagance of imagination. Depression soon supervenes, and the perceptive centres of the brain become depressed, so that pain and other impressions on the sensory nerves are no longer felt. At the same time the drug exerts a HYPNOTIC action, and the patient becomes drowsy and sleeps.

If the dose be excessive the stimulative stage is absent, and the cerebrum is profoundly depressed, and a comatose condition supervenes. The motor centres in the spinal cord are depressed by opium after a brief preliminary stimulation, and reflex movement is difficult to obtain.

The depression extends to the medullary centres, death by poisoning with opium being due to paralysis of the respiratory centre.

The afferent (including the sensory) NERVES of all organs of the body are DEPRESSED. The



sedative effects of opium on the nervous system are due to the presence of its principal alkaloid, *morphine*. The latter acts more quickly and certainly than opium, is better suited for subcutaneous injection, and less likely to derange digestion or cause constipation.

### Therapeutics.

A complete description of uses is impossible here, and a larger work must be consulted. Speaking generally, opium is employed to relieve pain and induce sleep. In prescribing it the following points have to be remembered—

1. That many persons, from *idiosyncrasy*, are unduly susceptible or resistant to its action. Children are extremely susceptible to the action of quite small doses, hence the dangerous nature of many teething powders which contain the drug. Persons who are accustomed to the habitual use of opium or morphine will often bear an enormous dose without effect, and large doses are tolerated in many diseased conditions attended by severe pain.

2. It is contra-indicated (because dangerous), or to be employed with great caution in certain diseases, notably respiratory and renal affections.

### Toxicology.

4 grains of *opium* and 2 drachms of *tincture of opium* have respectively proved fatal.

1 grain of *hydrochlorate of morphine* has caused death; and as a hypodermic injection, or in certain diseases, a smaller quantity might well prove fatal.



*Symptoms of poisoning.*

Drowsiness, sleep, coma.  
 Contraction of the pupils (pin-point pupils).  
 Abolition of reflex action.  
 Coldness of skin, lividity.  
 Pulse weak and slow.  
 Respiration slow and irregular, finally stertorous.

*Treatment.*

Wash out stomach with a solution of *permanganate of potash* (which decomposes morphine), 1 in 400, leaving a few ounces in the stomach.

Rouse patient, and keep him walking about if possible.

Stimulate by flicking, irritation, faradic current, ammonia to nostrils.

Strong coffee; *ether* hypodermically, 5 mins.

Give  $\frac{1}{20}$  gr. *atropine sulphate* subcutaneously every half-hour (atropine being the physiological antidote to morphine).

If respiration be failing, artificial respiration and oxygen inhalations.

Keep treatment up for several hours if necessary.

**Chloral Hydras.** CHLORAL HYDRATE.**Pharmacology and Therapeutics.**

ANTISEPTIC, LOCAL ANODYNE, HYPNOTIC,  
 DEPRESSANT OF HEART.

SEDATIVE. Chloral is a powerful HYPNOTIC, acting directly on the cerebrum. The sleep produced by this drug is of a natural character, and there are no unpleasant after-effects. It does not, however, relieve pain, save in dangerously large doses, though it may be useful combined with other anodyne medicines. Chloral is a powerful general depressant, and

in excessive doses affects the respiratory and vasomotor centres, the anterior coruna of the cord, and the heart.

The habit of chloral taking is unfortunately common; it leads to general weakness, gastric derangement, cardiac and respiratory depression, and insanity.

### Toxicology.

Eighty grains have proved fatal.

#### *Symptoms of poisoning.*

Coldness, lividity, weak, irregular, feeble pulse.  
Coma and abolition of reflex movements.

#### *Treatment.*

Wash out stomach, or give emetics.  
Stimulants as in opium poisoning (see above).  
Warmth, friction, massage.  
3 mins. *liquor strychninae* subcutaneously.

## Bromides of Potassium, Sodium, and Ammonium.

### Pharmacology and Therapeutics.

SEDATIVES to the nervous system generally;  
powerful HYPNOTICS, DEPRESSANT TO HEART'S  
ACTION.

SEDATIVE. In addition to sedative action on the cerebral centres, bromides reduce the reflex excitability of the spinal cord. The peripheral (including



the sensory) nerves are also depressed, and activity of the muscles diminished. Bromides are of some interest to the dentist, as they are occasionally employed for their sedative properties in the treatment of neuralgic affections, and in infantile convulsions due to teething.

They have been given, as physiologically antagonistic, in cases of strychnine poisoning.

## GENERAL ANÆSTHETICS.

**General Anæsthetics** are drugs that reduce or remove consciousness, and with it the perception of pain. Drugs of this class owe their anæsthetic properties to their action in temporarily arresting the functions of the cerebral convolutions. On the nervous system in general their action is—

**FIRSTLY, Stimulant**; this stage varying in length with the different anæsthetics. Stimulation of the highest centres occurs first.

**SECONDLY, Depressant**; depression, like stimulation, occurring first in the higher cerebral centres, and only after this affecting the important functions of the medulla and cord.

General anæsthetics are given to cause unconsciousness and freedom from pain during surgical operations; to relax muscles during reduction of dislocations, &c.; sometimes to relieve severe pain, as in parturition; and to check convulsions in tetanus and strychnine poisoning.

To the dentist they are of use—

(1) During the extraction of teeth and during small operations in the mouth.

(2) To relax the muscles of the jaw in reducing dislocation, and securing adaptation of the fragments after fracture.

(3) In cases of trismus due to dental causes, to allow of the mouth being forcibly opened, and of proper examination and treatment.

General anæsthetics are practically always administered by inhalation; though ether has been given per rectum with some success.



### Dangers of General Anæsthetics.

No general anæsthetic drug can be considered as absolutely safe, though with ordinary care and sufficient experience on the part of the administrator, risk is reduced to a minimum. In no case should the anæsthetic be given and operation performed by the same individual, as an anæsthetised patient must always be regarded as in a critical state, requiring the individual attention of some other skilled person than the operator.

The chief dangers are :—

#### 1. Death from shock.

This usually occurs before the patient is fully under the influence of the anæsthetic, and takes place from the reflex stoppage of the heart, owing to the stimulus of a premature commencement of the operation, an accident especially liable to happen in chloroform administration.

#### 2. Failure of respiration.

##### *Causes.*

(a) Overdose of anæsthetic drug.

(b) Interference with freedom of respiratory movements, from position of patient, tight clothing, pulmonary disease.

(c) Interference with main air passage, as from slipping back of tongue ; or passage into the trachea of vomited matter, blood, or foreign bodies, such as a tooth or piece of broken forceps.

##### *Symptoms.*

Lividity, forced inspiration, weak or slow respiration, stridor.

*Treatment.*

Recumbent posture, throw back head, pull tongue forward, clear air passages, loosen clothes, artificial respiration.

**3. Cardiac failure.***Causes.*

Overdose of anæsthetic drug ; vapour too concentrated.

*Symptoms.*

Pallor, feebleness, irregularity or disappearance of radial pulse.

*Treatment.*

Raise feet, lower head ; artificial respiration.

Stimulate heart directly by flicking chest with wet towel, or better, application of faradic current if available.

Inject subcutaneously **3** minims of *liquor strychninae* in a syringe of *brandy*.

Inhalation of *amyl-nitrite*.

Cardiac failure occasionally occurs in the early stages of anæsthesia, before commencement of the operation, and in these cases can hardly be ascribed to shock.

In all cases before administration of a general anæsthetic it is advisable to empty the rectum and bladder. Before a prolonged anæsthesia a purgative or enema should be administered as a routine practice (see p. 131), and no food should be taken some hours previously. Should vomiting occur the patient should be placed on his side in the recumbent posture.



### Choice of an Anæsthetic for Dental Operations.

For all operations which can be completed under one minute, gas is to be preferred, as it is practically free from risk, not unpleasant to take, and free from after-effects.

For operations lasting up to five minutes gas administered continuously by one of the recently introduced methods may be employed.

For longer operations ether narcosis, which may if desired be preceded by administration of gas, should be preferred, its greater safety compensating for other disadvantages. Chloroform should not be given.

**A local anæsthetic** (see p. 89 *et seq.*) may be used instead of a general where efficient and free from danger—

1. Where it will relieve the pain with only minor risks (not risks to life), and a general anæsthetic is not available.

2. In deference to the patient's fears or objection to losing consciousness.

3. In the absence of an experienced and qualified person to administer the anæsthetic.

4. When a prolonged effect is desired and a local anæsthetic will be efficient and less dangerous and troublesome than ether.

No dentist has any right to take a risk (which is not truly his, but the patient's) without fully explaining the risk to the patient and his friends beforehand.

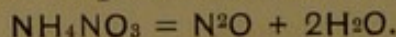
### Nitrous Oxide Gas. $\text{N}_2\text{O}$ . Not official.

#### Materia Medica.

*Synonym.* Laughing gas.

*Source.*

Prepared by heating ammonium nitrate in a retort, and collecting the gas which results, after purifying by passing through distilled water and solutions of ferrous sulphate and caustic potash.





### Pharmacology.

On being breathed the gas passes into the capillary vessels of the lungs and so to the circulation generally. In the blood it reduces the oxygen in combination with the hæmoglobin of the red cells, and itself forms an unstable combination with this substance. The nervous system soon comes under its influence. There is a brief stimulation of the cerebrum, shown chiefly by the subjective symptoms (extravagant ideation, hilarity), quickly followed by depression, which leads to loss of consciousness. Motor phenomena (struggling, &c.) are frequently absent, and if present are much less marked than with other general anæsthetics. If the administration be continued the other parts of the central nervous system become depressed, and death occurs from paralysis of the respiratory centre in the medulla, or from exclusion of oxygen. It is now generally held that nitrous oxide gas has a TRUE ANÆSTHETIC effect, and that its action is not solely due to causation of a condition of asphyxia, or deprivation of oxygen to the nervous tissues. That some degree of asphyxia results is shown by the occurrence of cyanosis in the deeper stages of anæsthesia. This is, however, entirely prevented by the admixture of oxygen with the nitrous oxide gas, a method now frequently adopted.

The heart's beat is increased in force and rapidity until deep anæsthesia is reached, when it becomes slower. If the administration is continued it becomes more and more feeble, and finally ceases, but always after respiration has ceased for some little time. In other words, a fatal dose of gas paralyzes the respiratory centre before the cardiac. Hence the value of artificial respiration as a resuscitating measure should an overdose have been given.

The respirations are at first quickened and increased in depth, then gradually shallower, finally stertorous.

Blood pressure rises, and the cerebral blood-vessels become markedly distended.



In the deeper stages of anæsthesia, twitchings, jactitation or irregular contractions of the voluntary muscles commonly occur.

The clinical signs of complete anæsthesia are—

1. Abolition of the pupillary light reflex (early).
2. Slow and stertorous respiration.
3. Pallor or slight bluish tinge of the face.
4. Muscular twitchings.

Where oxygen is given with the gas, the first sign is the only constant one.

### Therapeutics.

Nitrous oxide gas may be administered—

1. Pure, that is with air excluded.
2. Mixed with a small proportion of air.
3. Mixed with oxygen.

It is the safest general anæsthetic we possess; cases of death occurring from its administration being of very great rarity, and unknown in gas and oxygen anæsthesia. Hence for short operations, lasting one minute or less, it is to be preferred to all others.

The great objection is the brevity of the duration of the anæsthesia (30 to 60 seconds), and to overcome this objection various forms of apparatus have been recently introduced to allow of a continuous administration during oral operations. A more prolonged narcosis, up to 10 or 15 minutes, may in suitable cases be obtained in this way, though results seem to vary with different individuals, and "asphyxial" symptoms (cyanosis, &c.) are frequently prominent.

**Note.** That retching or vomiting occasionally occurs under gas. Passage of urine sometimes takes place. In female patients delusions of a sexual nature may result.

Hence gas should not be taken on a full stomach; the bladder should be emptied previously; and no female patient should be anæsthetised without the presence of a third person.



Nitrous oxide gas is *contra-indicated* in persons suffering from disease of the blood-vessels (as in chronic Bright's disease), for the rise of blood pressure and dilatation of the cerebral vessels, mentioned above, may lead to an apoplectic seizure from rupture of one of the latter.

**Æther.** ETHER.  $(C_2H_5)_2O$ .

### Materia Medica.

*Synonyms.* Sulphuric Ether.

*Composition.* 92% by volume of ethyl oxide, and 8% ethylic alcohol.

*Dose.* 10 to 30 mins. for repeated administrations.  
40 to 60 mins. for single administrations.

### Pharmacology.

GENERAL ANÆSTHETIC; LOCAL ANÆSTHETIC (refrigerant); INTERNALLY CARMINATIVE; CARDIAC STIMULANT.

ANÆSTHETIC.—Ether vapour when inhaled is speedily absorbed into the blood from the lungs, and manifests its effects on the nervous system. These effects are commonly divided into three stages, which, however, pass insensibly the one into the other.

1. The stimulation stage, in which are affected—

- (a) The higher cerebral centres, shown by incoherence of thought, excited imagination, disorders of sight and hearing.
- (b) The lower motor cerebral centres, shown by shouting or talking, throwing limbs about, or struggling.



- (c) The medullary centres, increase of pulse rate, rise of blood - pressure, and respiratory movements.

2. The stage of depression. All the cerebral centres affected, consciousness lost, movements of voluntary muscles cease, medullary centres also somewhat depressed, pulse and respiration less frequent and strong, pupils contracted ; some reflexes lost—*e.g.*, conjunctival. This is the stage at which to perform surgical operations.

3. The stage of abolition of all reflex excitability. Muscles lose their tone, pupils dilated, urine and fæces frequently passed ; all nervous centres profoundly depressed.

The drug has occasionally to be pushed to this stage to obtain total muscular relaxation for the reduction of dislocations or exploration of viscera through the abdominal wall.

If more of the drug be given the depression of the medullary centres continues, the respirations become weak and shallow, the pulse feeble and irregular, blood pressure gradually falls, and the heart stops finally in diastole.

### Therapeutics.

**General anæsthetic.** Ether is to be preferred to chloroform as a general anæsthetic for prolonged operations, as it has the great advantage of depressing the heart less than the latter drug ; and the same is true of the vaso-motor and respiratory centres. It should be avoided, however, in the case of very young or aged patients, in whom the respiratory mucous membrane is likely to be irritated by its

vapour, and bronchitis to be set up ; also in the case of persons already suffering from this affection. The following are its disadvantages as compared with chloroform, which are, as a rule, however, more than compensated for by its **greater safety**.

1. The stage of stimulation is more protracted, and there is more struggling.

To overcome this objection anæsthesia is often induced in the first instance by nitrous oxide gas, passing on to ether when the patient is well under.

2. The anæsthesia is shorter and the degree less profound.

3. Ether vapour is an irritant to the respiratory mucous membrane.

So that, as mentioned above, it is sometimes contra-indicated.

4. It is more disagreeable to take, and the smell is apt to hang about the patient for some time.

5. Ether vapour is very inflammable and must not be used in proximity to a flame.

6. Ether must be given nearly pure (about 70% vapour to 30% of air). It is more difficult to administer than chloroform, and special apparatus is required.

### **Chloroformum.** CHLOROFORM. $\text{CHCl}_3$ .

#### **Materia Medica.**

*Synonym.* Trichlormethane.

*Composition.* Usually sold mixed with 1% alcohol to preserve it from decomposing.



*Solubility.*

1 in 200 of water.  
10 „ 7 „ alcohol.  
Freely in ether or olive oil.

*Preparation. Spiritus Chloroformi* (chloric ether),  
1 in 20.

Dose. 5 to 20 mins.

**Pharmacology.** GENERAL ANÆSTHETIC (applied externally), COUNTER-IRRITANT (taken by the mouth), STOMACHIC, FLAVOURING AGENT, a SOLVENT of various substances.

**Pharmacology and Therapeutics.**

GENERAL ANÆSTHETIC. The phenomena of chloroform anæsthesia are similar to those described under ether (see p. 181). The stimulation stage is less protracted. Chloroform may be preferred to ether for prolonged operations where the latter drug is contra-indicated (see p. 182), but has a much greater depressant effect on the heart and medullary centres.

The two drugs are sometimes given in combination, a mixture of alcohol, chloroform, and ether (*A.C.E. mixture*) being employed.

Death from chloroform administration is unfortunately too common, the risks described above being especially pronounced. (See "Dangers of Anæsthetics," p. 176 *et seq.*)

A quite disproportionately large number of fatalities have arisen in the course of dental practice, and it may be said that chloroform should *never* be employed to anæsthetise patients for extraction of teeth, save in cases of most extreme emergency.

It must then be administered with the patient in a recumbent position (on no account sitting in a dental chair in the ordinary way), and only by a properly qualified medical man. These precautions must also be taken if it be used as a means of relaxing muscular spasm, in reducing dislocation or setting fractures of the jaw.

**Aethyl Chloridum.** See p. 104. Not official.

**Pharmacology.**

LOCAL ANÆSTHETIC (refrigerant); GENERAL ANÆSTHETIC.

Ethyl chloride (sold under the fancy name of Kelene) has lately been re-introduced as a GENERAL ANÆSTHETIC. This substance is exceedingly volatile, and therefore very transient in its effects when inhaled. It does not produce muscular relaxation, or even always loss of consciousness, though in the latter case it may have an analgesic if not a true anæsthetic effect. The induction of anæsthesia with ethyl chloride frequently takes longer than with either chloroform or ether, and the results are not so certain. Owing to its rapid evaporation it produces intense cold, and is apt, therefore, to cause undue chilling of the respiratory mucous membrane when inhaled.

Ethyl chloride has a depressing effect upon the circulation, which is often pronounced, and this fact renders it an unsafe anæsthetic, and one that should not be employed.



## APPENDIX.

## FILLING MATERIALS.

The ideal filling material should be—

Hard, tough, and non-porous.

Insoluble in the fluids of the mouth.

Adhesive.

Constant in shape and size. Non-warping and  
non-shrinking.

Non-conducting.

Non-irritating.

Easily adaptable.

A good colour.

The fillings produced by each material will be compared with this as practically as the brevity of this chapter will permit, the subject being far too large for full and detailed exposition.

## Gold.

1. Cohesive.

2. Non-cohesive.

Cohesive gold.

## COMPOSITION.

Chemically pure gold.

Gold is soluble in mercury, and care must be exercised in placing amalgams in combination with gold.

## PREPARATION.

The pure gold may be hammered out into thin foil, each 4 sq. inches, weighing 4 grs., and known as No. 4 ; or heavier foils, ranging from No. 4 to No. 60, may be used. The foil may be hammered out still finer, and rolled into cylinders or rope. Or the gold may be dissolved and redeposited in the form of feathery masses, known as mat gold, or "crystal gold."

## PROPERTIES.

Pure gold in thin strips can be cold-welded by a pressure that is insufficient to damage moderately strong cavity walls.

Cohesive gold produces a filling which is—

**Hard, tough, and non-porous.**

Hard enough to withstand the force of mastication when resting on a broad base. It is the toughest of filling materials, and thin edges may be trusted to remain in place. The porosity of gold fillings depends mainly on imperfection of manipulation, and to a less extent on insufficient condensing. It does not seem possible to make an absolutely non-porous gold filling in the mouth, but they can be made practically non-porous.

**Insoluble.**

**Not adhesive.**

**Constant in shape and size.**

An interstitial filling exposed to a heavy biting strain, and not well supported by a sufficiently broad base, will in time be bent away from the tooth wall and leak.

**Highly conducting.**

**Non-irritating.**

**Difficult to adapt.**

**Of a bright, clean, yellow colour.**



Foil is the most generally useful form and capable of the most exact and delicate manipulation. Cylinders and rope are less liable to rock when starting a cavity, but more difficult to adapt exactly to the edges and recesses. **Mat** gold is the least liable to rock, but the most difficult with which to form a tough, non-porous, and exact-fitting plug.

### Non-cohesive gold.

#### COMPOSITION.

Pure gold.

#### PREPARATION.

Non-cohesive gold is only prepared in the form of foil (No. 4) and cylinders or rope. It is pure gold, the surface of which has been exposed to the action of some gases and has lost its cohesive property. There is a great difference in the softness of different makes.

#### PROPERTIES.

Non-cohesive gold produces a filling which is—

**Hard, tough, non-porous.**

Non-cohesive or "soft gold" can, by proper condensation, be made to produce a filling quite capable of withstanding mastication. The gold, being all in separate pieces, must be well supported or the pieces will be driven apart, and in this sense it is not tough, but the edges are not brittle, and if properly constructed will not fray.

**Insoluble.**

**Non-adhesive.**

**Constant in shape and size.**

The absence of cohesion must be remembered, and the filling not exposed to a force tending to drag the portions of the gold over each other in the direction of their long axis.

Highly conducting.

But not so highly as cohesive gold.

Non-irritating.

Difficult of adaption.

Of a bright, clean, yellow colour.

### Amalgams.

There are very many amalgams in use, but it is only proposed to deal with three here, viz.,

A silver-tin amalgam, having a formula of

Silver	68·5
Tin	24·5
Gold	5
Zinc	1

A copper amalgam (Sullivan or Rogers), composed of

Copper and mercury.

And palladium amalgam, composed of

Palladium and mercury.

The last two are of little use, but the former is a representative of a most important class of filling materials, made up of a basis of silver and tin in the proportions of about 7 to 3, to which various other metals have been added in small quantities. The various metals suggested are—

Gold, platinum, copper, bismuth, and zinc.

The exact effects which these have on the mixture are very differently stated by different writers.

For the full description of the many interesting and practically important points about amalgams, other works must be consulted, as they are rather outside the scope of this book, and too complex to be reduced into brief notes.



**Silver-tin amalgam.****PREPARATION of a silver-tin amalgam.**

The ingredients are weighed out, and then melted together, melting the most fusible first, and adding the others in the order of their fusibility, so as to employ as little heat as possible. During the fusion the metals should be well protected from the air to prevent oxidation. The ingot is then reduced to filings, and "annealed" or "aged" by heating it gently (130° F.) for a few days.

**PROPERTIES.**

**Hard, fairly tough, and non-porous.**

The edge strength of amalgams is much below that of gold, and thin edges of fillings are not permissible with this material.

**Insoluble.**

**Non-adhesive.**

**Constant in shape and size.**

Fillings made with an unequal distribution of mercury will warp. Thin edges warp and get chipped. Heavy masticating stress will cause an insufficiently supported filling to "flow" away from the tooth wall. There are some slight alterations in setting, and crystallisation of the surface occurs after setting, but within such small limits that practically a sound filling can be made.

**Conducting.**

**Non-irritating.**

**Easily adaptable.**

**Of a light grey colour.**

The granular (crystalline) surface of an amalgam may, after a few days, be polished to a bright silvery surface, which can be kept bright by the patient. Amalgam will show dark through a thin layer of enamel and dentine.

**Copper amalgam.****PREPARATION.**

Sheets of iron or zinc are immersed in a saturated solution of copper sulphate, the precipitated copper is scraped from the plates and washed with water or dilute sulphuric acid. It is then placed in a mortar with six times its weight of mercury and thoroughly mixed and washed until the washings come away colourless. Then it is squeezed through wash-leather to get rid of the excess of mercury, divided into small pieces, and allowed to set.

**PROPERTIES.**

**Not very hard, fairly tough, non-porous.**

Copper amalgam wears away under mastication, but the thin edges thus formed do not curl up or chip.

**Soluble.**

Copper amalgams differ very much in this respect, and the exact causes of the dissolution are not known, but all copper amalgams gradually wash away, and some very rapidly.

**Non-adhesive.**

**Constant in shape and size.**

The wearing and dissolving excepted.

**Conducting.**

**Non-irritating.**

**Easily adaptable.**

**Black.**

Copper amalgams not only turn quite black, but they also stain the tooth either black or green, the stain being probably copper acetate.

The hardening and disinfecting properties of, and mercurial poisoning from, copper amalgams are mythical.



As copper amalgams continue to give off minute quantities of mercury during the disintegration, gold clasps must not be fitted round teeth containing these fillings. Copper amalgam is very variable in its lasting properties.

### **Palladium amalgam.**

#### **PREPARATION AND COMPOSITION.**

Pure palladium is mixed with mercury at the time of using, and very quickly sets.

#### **PROPERTIES.**

Hard, tough, non-porous.

Insoluble.

Non-adhesive.

Expands whilst setting.

Conducting.

Non-irritating.

Difficult to adapt.

Black.

It does not stain the teeth.

Its rate of setting is so great, and so much heat is generated, that it is not of much practical use.

### **Osteo-Plastics.**

1. Oxy-chloride of zinc.
2. Oxy-phosphate of zinc.
3. Oxy-sulphate of zinc.

**Oxy-chloride of zinc.****COMPOSITION.**

The powder consists of oxide of zinc, to which may be added colouring material, powdered glass, silica, borax.

The fluid is a solution of zinc chloride.

**PREPARATION.**

Very little is really known of the actual preparation of the osteo-plastics, the various processes being trade secrets. The mere mixing of the pure ingredients, as we know them, does not produce a satisfactory filling material.

**PROPERTIES.**

Moderately hard and tough, porous.

Oxy-chloride is harder than oxy-phosphate, but it wears out under the force of mastication.

Soluble.

Oxy-chloride is even more soluble than oxy-phosphate.

Adhesive.

Constant in form and shape.

Non-conducting.

Irritant.

Easily adapted.

Good colour.

Oxy-chloride fillings contain a certain amount of free zinc chloride, which is a caustic and disinfectant, so that these fillings have a caustic and disinfectant effect on the dentine. Oxy-chloride can be mixed much more fluid than oxy-phosphate, and will yet set hard.



**Oxy-phosphate.****COMPOSITION.**

The powder consists of oxide of zinc, to which may be added colouring matter, silica, aluminium phosphate, borax.

The fluid is orthophosphoric acid, to which glycerine is at times added.

**PREPARATION.**

Not accurately known.

**PROPERTIES.**

Moderately hard and tough, porous.

Oxy-phosphate is not so hard as oxy-chloride; it wears away under ordinary mastication; different makes and different mixes vary as to porosity.

**Soluble.**

Oxy-phosphate is less soluble than the oxy-chloride, but varies very widely in different cases.

**Adhesive.**

Constant in shape and size.

Non-conducting.

Slightly irritating.

Due principally to the free phosphoric acid.

Easily adapted.

Good colour.

**Oxy-sulphate. (Fletcher's artificial dentine.)****COMPOSITION.**

The powder consists of zinc sulphate 1 part and zinc oxide 2 parts, calcined. The fluid is composed

of a solution of 15 grs. of gum to the ounce of water, to which 1 gr. of sulphide of lime is added, and the whole filtered.

## PROPERTIES.

Soft, friable, and porous.

Soluble.

Slightly adhesive.

Constant in shape and size.

Non-conducting.

Non-irritating.

Easily adaptable.

White.

This substance is only intended as a lining material, and is a most excellent preparation. It lends itself well to medication, a mixture containing 10 % of carbolic acid appearing to set firmer than the ordinary preparation.

**Gutta-Percha.**

## COMPOSITION.

Many different makes of gutta-percha fillings exist, containing, in addition to crude gutta-percha, which is itself a mixture of gutta and resins, various hardening materials, such as oxide of zinc, lime, silica, and kaolin in proportions varying from 15 to 80 %. W. Rushton recommends :—

Pure gutta (freed from resins)	50 parts.
Finely levigated silica	30 parts.
Oxide of zinc	20 parts.



## PREPARATIONS.

Spirit is added to a solution of gutta-percha, which dissolves out the resins and precipitates the gutta. The gutta is heated, and the powders gradually and thoroughly mixed with it.

## PROPERTIES.

Soft, tough, non-porous.

Gutta-percha is not hard enough to bear the force of mastication, but yields and is soon bitten out of shape if exposed to the bite.

Insoluble.

Adhesive.

Gutta-percha prepared as above is not very adhesive. The adhesion may be increased by moistening the surface with *eucalyptus* or *cajuput oil* and heating.

Constant in shape and size.

Gutta-percha sometimes swells in the mouth, and if exposed to mastication is readily driven out of place.

Non-conducting.

Non-irritating.

Easily adaptable.

Of a good colour.

**Gum Resins.** See p. 116.

Are but temporary fillings.

*Gum sandarac*, *mastic*, or *dammar* dissolved in *alcohol* to form a solution about the consistency of thin treacle, or *gum copal*, similarly dissolved in *ether*, when mixed with cotton-wool, form a water-tight dressing which will endure for a few days.

## THE CLEANSING OF THE MOUTH.

In cleansing the mouth use is made of both—

1. Mechanical Methods.
2. Chemical Methods.

The latter including :—

### SOLVENTS, ANTISEPTICS, ANTACIDS.

The greater importance in our present state of knowledge belongs to the **mechanical** method.

The various means used for this purpose are **tooth-brushes, tooth-picks, silk, and canes**, used with or without the help of **tooth-powders, tooth-pastes, tooth-washes**.

The **chemical** method is only an adjuvant to the mechanical, assisting or supplementing its action. The various means employed are **tooth-powders, tooth-pastes, tooth-washes, and mouth-washes**.

### 1. Mechanical Methods.

#### The Tooth-Brush.

Great variety of opinion exists as to what kind and shape of brush to use. The **function** of the brush is to mechanically scrape the teeth and gums. If it is made hard enough to remove all the material that may be found adhering to the surface of dirty teeth, it will be hard enough to scratch the gums, and even the teeth, harmfully, especially if used vigorously in conjunction with powder.

If it be made very soft (badgers' hair), it will not be able to remove the *débris* from the teeth, unless very frequently employed.



Moreover, it must be obvious that, however stiff and well arranged the bristles may be, they will not penetrate between a normally arranged set of teeth. Thus the weakest point remains uncleaned.

We would therefore advocate that the teeth be first thoroughly cleansed by the dentist, when a medium soft brush is sufficient to keep the surfaces free from *débris* and calculus, if it is used carefully and thoroughly twice a day.

The finer bristles—of a soft brush—will penetrate better than the stouter hard ones, and the amount of friction to the gums will be a healthy stimulus rather than a laceration.

The brush should be **small** enough to enable it to be freely moved about and around the teeth.

It is very doubtful whether any eccentric arrangement of the bristles, as to length and position, will practically procure deeper penetration between the teeth than the ordinary arrangement in a softish brush.

The brush should be used both with a horizontal movement over the buccal and labial aspects of the teeth and gums, as this cleans the exposed cervical margins and sulci well; also with a vertical movement, directed chiefly downwards on the upper teeth and upwards on the lower teeth, in order to brush out *débris* from between the teeth. The lingual aspects of the teeth can only be reached with a more or less vertical movement, the occlusal surfaces with a horizontal motion.

A tooth-pick is a very useful and, in some cases where the interdental spaces are irregular, necessary means for cleansing between the teeth. It should be **small**, pliable, pointed at one end and rounded and flatter at the other, made of quill or very thin celluloid.

Metal tooth-picks are to be avoided, because they are too thick to penetrate, too stiff to fit, and are sharp and hard enough to damage teeth and fillings. They are also too expensive to throw away after using.



Silk is a very effectual means of cleansing between the teeth, but few patients will take the trouble which its use involves.

Dipping the silk in a strong and lasting disinfectant, such as 1 to 100  $H_2O_2$ , will help to prevent fermentation.

A cane cut to a flattened point at one end and frayed out to form a brush at the other is, if diligently used, a very good all-round instrument for cleansing the teeth.

### Tooth-Powders.

Tooth-powders are not desirable if the mouth is clean to begin with and carefully brushed twice a day.

They are also at times harmful by causing abrasion of the teeth, and by packing in between the teeth they irritate the gum, help to form tartar, and a nidus for fermentation.

Yet as human effort is not always perfect, it is often advisable to increase the scouring action of the brush by using some powder on it.

*Chalk*, or chalk with a little powdered *cuttle-fish*, is usually sufficiently abrasive. Pumice, powdered shell, or palpable grit are not permissible for use by the patient himself. A small proportion of *soap* in the form of powder greatly assists in cleansing the teeth.

The insoluble nature of chalk is to be regretted, but such substitutes as magnesia are unpopular on account of their taste and liability to cake. Charcoal, in any form, is contra-indicated for fear of tattooing the gum.

Flavouring and perfuming agents, such as *otto of roses*, *eucalyptol*, *saccharine*, *menthol*, or *essential oils*, may be added in small quantities.

As regards disinfectants, it is scarcely possible to introduce any drug in sufficient quantity and strength to be of practical service in the short time during which powder remains on the teeth without making it unpalatable or corrosive.



The following prescriptions may be of use :—

For occasional use in cleanly mouths.

R

*Cretae Precipitatae*       $\frac{3}{4}$  ij.

Signa. The tooth-powder.

For use where brushing is less assiduously performed.

R

*Pulvis Potassii Chloratis*

„ „ *Bicarbonatis*      āā  $\frac{3}{4}$  jss.

„ *Iridis*

„ *Saponis*

„ *Ossis sepiæ*      āā  $\frac{3}{4}$  iij.

„ *Glusidi*      grs. ij.

*Cretae Precipitatae*       $\frac{3}{4}$  iv.

*Olei Menthae Piperitæ*

„ *Gaultheriæ*      āā m. vj.

Misce.

Signa. The tooth-powder.

### Tooth-Pastes

Have the same disadvantage as powders, with the additional one that they are often compounded with a sugary (fermentable) base.

### Tooth-Soap.

The use of soap on the tooth-brush is highly to be commended as aiding in the solution of *débris* and calculus, increasing the penetration of the bristles, and as being alkaline. It can have no ill-effect. As to the kind of soap, taste is the only consideration.

## II. Chemical Method.

### Mouth-washes

Enjoy great popularity, but the question as to how much of their beneficial effects is due to the accompanying **mechanical** cleaning, and how much to their **chemical** action, is an open one.

This much may be, however, clearly stated—that no mouth-wash will do any permanent good unless the mouth be properly cleaned.

With the possible exception of such specifics as *chlorate of potash*, no drug will cure inflammatory conditions by being merely swilled over a few times a day. It would always be better if the mouth-wash were carefully **swabbed** over the affected part after proper previous cleaning; also in using mouth-washes in the ordinary way their **rapid dilution and removal** by the saliva must be remembered.

Mouth-washes are employed for a variety of purposes, and should be carefully **adapted** to the particular case under consideration.

The following actions and properties of mouth-washes may be usefully considered :—

#### 1. Deodorising action.

The odour of the breath due to fermentation in the buccal cavity, or to tobacco smoke, may be at once cured by brushing the teeth and holding a weak solution (claret coloured) of *permanganate of potash* in the mouth for a minute or two. This is only a temporary remedy. A permanent cure can only be effected by a thorough removal of all *débris*, concretions, and carious dentine, and proper disinfection. An active gumboil, indigestion, bronchiectasis, or tonsilitic calculus may be the cause of the smell, and should be treated *secundum artem*.



## 2. Disinfectant action.

Thorough mechanical cleaning must first be employed in order to remove all fermentable material and allow free access of the drugs to all parts. This alone will very greatly reduce the number and variety of germs in the mouth.

Very little scientific work has been done in testing the disinfectant powers of mouth-washes.

Miller states that it is almost impossible to perfectly disinfect the mouth, but after cleansing the following drugs are efficient :—

<i>Perchloride of mercury</i>	1 in 2000
<i>Salicylic or Benzoic acid</i>	1 in 200
<i>Listerine</i>	1 in 2

A mouth-wash to be efficient must penetrate fairly well and act in a minute.

## 3. Antiseptic action.

Antiseptic mouth-washes to be of any use must be very frequently employed. They do not destroy germs, and only prevent their growth until they are much diluted or removed by the saliva. They nevertheless seem to have a beneficial action in washing away, diluting, or neutralising the germs and their ptomaines, and by removing fermentable material, thus assisting the tissues to overcome the germs.

<i>Carbolic acid and liquor potassae</i>	1 in 2500
<i>Permanganate of potash</i>	1 in 1000
<i>Listerine</i>	1 in 4
<i>Zinc chloride</i>	4 grs. to 1 oz.
<i>Peroxide of hydrogen</i>	1 in 30

—are all thus employed.

## 4. Cleansing action.

The mechanical action of the mouth-wash is, perhaps, its most valuable property. Solutions con-

taining *soap* or *liquor potassae* are very useful in removing mucus and dead epithelium, and thus allowing other drugs and the tissues to act at greater advantage. The brush should be used in conjunction with it.

#### 5. Stimulant and Irritant action.

A slight amount of irritation, or stimulation, by increasing the activity of the circulation, may hasten the recovery of chronically inflamed tissues ; if long continued, or at all intense, it will do more harm than good. *Pyrethrum*, *alcohol*, and the *essential oils* are useful in this connection.

The use of strong irritants destroys the tissues, produces a mass of dead tissue or lymph favourable for the growth of germs, and prevents the process of normal repair. This action may far exceed any useful disinfectant or styptic action the drug may possess.

A stimulant action on the mouth will have a beneficial effect on digestion.

#### 6. Astringent action.

A swollen and lax condition of the gums, usually accompanied by hyperæmia and an excessive secretion of mucus, is very favourable to the growth of germs and spread of caries. Frequent applications of astringent lotions are of decided value in the relief of this condition. The various preparations containing *tannin*, *copper sulphate*, *alcohol*, *myrrh*, &c., may be employed.

#### 7. Antacid action.

The best ways of maintaining an alkaline reaction in the mouth are by the prevention of fermentation,



the removal of mucus, and stimulation of the salivary flow. Direct antacids, such as *liquor potasse*, *sodium bicarbonate*, and *magnesia hydrocarbonate*, are of temporary use.

The alkalinity produced by drugs disappears as soon as the saliva has washed them away.

### 8. Anodyne action.

For the relief of pain and tenderness it is best to direct our efforts to removing the cause of the discomfort and to assisting the tissues to recover. Anodyne drugs should only be temporary remedies. *Cocaine*, *opium*, *carbolic acid* and *tragacanth* are useful, but must not be thoughtlessly employed.

The temperature of the mouth-wash may be of great comfort. No anodyne may be used that will hinder the healthy healing of the wound.

### 9. Sialagogue action.

This is a minor, but useful, point to be considered. Pleasant and warm-tasting solutions produce a flow of saliva ; metallic and flat tastes decrease it.

### 10. Demulcent or protective action.

In raw and tender conditions of the mouth a protective and soothing glutinous application is useful. Acidly fermentable substances are to be avoided, and it must be remembered that taste and the activity of other drugs will be reduced. It is on account of the demulcent properties of *gums* and *resins* that natural preparations of drugs are more kindly in their actions than the pure (dilute) alkaloids, &c. *Glycerine* and *tragacanth* may be useful.

## 11. Taste, smell and appearance

Should all be considered and made as pleasant as our limited pharmacopœia will permit. *Chloroform, menthol, eucalyptus, eau de Cologne, krameria*, and *cochineal* are of use.

## 12. Poisonous action.

It is undesirable to employ substances which, if swallowed, would be liable to produce constitutional derangements. For example, *opium, perchloride* of mercury, and *cocaine*.



## DRUGS WHICH, APPLIED LOCALLY OR ADMINISTERED INTERNALLY, HARMFULLY AFFECT THE TEETH AND ASSOCIATED STRUCTURES.

### Applied locally.

#### Acids.

Very dilute solutions of weak acids, if applied continuously, do appreciably destroy the enamel. In the mouth, acid drinks (cider, lemonade), gargles (alum), medicines (dilute acids), or foods (fruits), are not applied continuously, but very intermittently, and in the case of fluids mostly to the exposed surfaces; hence little harm is to be expected unless the application is very frequent.

The acids which produce decay are produced in particles of food wedged in between the teeth, or in the meshes of the "gelatinous plaques" which adhere to the teeth, and so are continuously applied. Alkali workers, who are exposed to acid fumes, and the dwellers in cider districts suffer from bad teeth, presumably due to the decalcifying action of these acids.

Acid washes or applications to remove tartar or enlarge a root-canal most certainly also decalcify enamel.

#### Grit.

The use of hard, sharp, powdered substances in tooth powders, such as powdered shell, diatoms, and pumice, when regularly applied, will wear away the teeth and also drive back the gum. Insoluble powders, especially alkaline ones, and powders mixed with



sugary and sticky compounds, when used as tooth powders or pastes, are apt to lodge in the crevices between the teeth and around their necks, thus forming calculi or tartar and so loosening the teeth; or they form a nidus in which fermentation may go on, to the destruction of the teeth, thus doing harm indirectly. Charcoal as a tooth-powder is apt to tattoo the gum blue.

### Stains.

It is quite impossible to stain enamel. Stains may lodge on its surface, especially if rough, and in the adherent film found on teeth, but they may all be removed by polishing, and the teeth kept free by constant careful brushing. The yellowing of teeth is due to changes in the dentine beneath the enamel, or to slowly acting acids. The exposed dentine or cementum may be much more readily affected and may be stained black by *silver nitrate*, either green or black by *copper salts*, and green by *nickel salts* (from screw posts), and according to some observers by *mercurial salts* also. Iodine stains are transitory. The reddening effect of nascent oxygen on a recently darkened tooth is due to the oxidising action on the contained hæmoglobin, and will after a while turn to a yellow tint as degenerative changes occur. The use of arsenic in some cases appears to stain the root yellow, due to the formation of the yellow sulphide ( $\text{As}_2\text{S}_3$ ).

Various articles of food, medicines containing iron or tannin, and the products of the action of chromogenic bacteria will stain dentine. Iron, either taken as a medicine or naturally in food, readily combines with the *tannin* contained in the food (*e.g.*, tea) to form black tannates, which stain the surface of the teeth; this stain can be removed by proper brushing.

The idea that *iron* damages the teeth is erroneous. Iron tonics are often prescribed with an acid adjuvant which will damage teeth, but the most harm is done by the anæmia, &c., for which the iron is given.



### Caustics,

Such as *arsenious acid*, *caustic potash*, or *zinc chloride*, applied to, or allowed to escape on, the gum margin, and not quickly removed, will cause a septic inflammation and destruction of the tissues. *Phosphorus* entering the system through a dead tooth or pyorrhoea pocket will cause necrosis of the jaw by lowering the vitality of the tissues.

### Taken internally.

Drugs taken internally, to harmfully affect the teeth themselves, must be taken during the growth of the teeth; the gums and periosteum, and so indirectly the teeth may be affected at any time.

*Mercury* has been credited with causing the hypoplastic condition often seen in teeth. The evidence of this and the mode of its action is very obscure.

In favour of the view is the fact that children to whom mercury has been administered do sometimes have hypoplastic teeth, and the fact that we know the administration of mercury may cause inflammation of the gums, and therefore an abnormal condition in the immediate vicinity of the forming teeth.

Against the view, we know that many children to whom no mercury has been given have hypoplastic teeth, and many children to whom mercury has been given have not, and the period corresponding to the amount of hypoplasia is not a few days, but months, rather corresponding to periods of malnutrition than the passing effect of a dose of medicine. Finally, there is a definite connection between the periods of hypoplasia and several general diseases, especially the exanthemata.

*Mercury, lead, bismuth, silver, or copper*, administered at any time, is excreted partly by the oral mucous membrane, and if septic conditions are

present it will cause more or less inflammation, at times leading to necrosis of the jaw and loss of the teeth.

All these drugs are in part excreted from the mucous membrane, and *lead* *antimony* and *bismuth* produce a blue or bluish-black line on the gums; *copper* may produce a greenish-blue line. These lines only occur round the teeth, and especially decayed or dirty teeth, and are apparently due to a precipitation of the metal in the tissue.

Silver stains all the tissues when administered for a prolonged period. In Addison's disease a delicate black line may appear on the gum.

A lead line must not be mistaken for the tattooing produced by the use of *charcoal* as a tooth powder. The latter always occurs in particularly cleanly mouths and healthy people. In the former, the mouth is very foul and the patient anæmic. A lead line will in time disappear—about three months under proper treatment.



## THE RESTORATION OF COLOUR IN DEVITALIZED AND DISCOLOURED TEETH.

BY W. F. MELLERSH.

It is not possible in a short *résumé* of the subject to enter into a description of each and every bleaching method.

Those who wish for fuller information should refer to such books as the "Text-Book of Operative Dentistry," edited by Dr. Kirk; "Dental Medicine," Gorgas; "Cataphoresis," Morton; and Gillett.

In order to gain a clear understanding of what the problem with which we have to deal is, we must remember that the bulk of a tooth is composed of dentine, a substance permeated by a multitude of tubuli containing organic matter.

One of the most common causes of stained dentine is hæmoglobin and the derivatives thereof. These invade the tubuli of the dentine, and discoloration of the tooth thereby ensues. See p. 122.

The other most common cause of discoloration requiring treatment is the staining by amalgam fillings, and it will, I think, be sufficient for our purpose here if we consider how these two classes of stains may be most effectually dealt with.

In all cases of dead teeth all carious *débris* and fillings must first be removed.

Before the bleaching agent is applied, the tooth must be insulated from the other teeth by means of the rubber dam, and special care must be taken to ligature it securely, so that there will be no leakage on to the gums, the oxygen producers being strongly escharotic.

Next, the roots must be rendered aseptic by the usual methods and filled with gutta-percha for about



half their length, so as to insure complete closure of their apices, whilst not preventing the bleaching agent from easily reaching that part of the dentine about the neck of the tooth, which I have generally found to be more resistant to their action than the dentine of the crown proper.

It is most important in the treatment of the roots to use, as medicaments, those which are non-coagulants.

The essential oils, such as cinnamon, will deeply stain dead teeth, although, by means of repeated cataphoretic applications of caustic pyrozone, I have succeeded in bleaching front teeth so stained; their use is contra-indicated.

Assuming that the tooth to be bleached has been stained by hæmoglobin or its derivatives.—After the rubber dam is adjusted, and the cavity and root fully cleaned and prepared, some peroxide of sodium ( $\text{Na}_2\text{O}_2$ ), in its original form of a dry powder, is introduced into the cavity, wooden or aluminium instruments being employed. This rapidly absorbs moisture from the atmosphere and becomes a somewhat soapy-looking bubbling mass, oxygen being rapidly evolved, and the contents of the dentinal tubes saponified. They can then be removed by repeated washings with hot water.

The  $\text{Na}_2\text{O}_2$  by itself may sufficiently bleach the tooth, but if the colour is not sufficiently restored after washing, the cavity should be thoroughly dried and saturated with 25% solution of hydrogen peroxide in ether, known as caustic pyrozone.

If this solution is first made alkaline by the addition of a few drops of Liq. Amm. Fort., more rapid results may be obtained.

The enamel also should be washed with this solution, and the whole tooth dried thoroughly with a hot air syringe. The cavity should be finally thoroughly washed with hot water.

This procedure I have found to be generally sufficient, but in some cases where a brown stain persists,



an application of a dilute solution of oxalic acid to the interior of the cavity, and drying with the hot air syringe, should complete the bleaching, but at the risk of damaging the enamel. Before filling wash out the cavity thoroughly with a solution of sodium bicarbonate, followed by plenty of hot water. After any of these processes dry the cavity, saturate the dentine with a white shellac varnish, harden this with hot air, fill with osteo, and cover this with either porcelain, gold, or amalgam.

Some observers have stated that the ashy grey discoloration is difficult to treat. The writer recently bleached a central incisor, which had been dead and of this colour for six years, by the simple expedient of sealing in the tooth for twenty-four hours a pledget of wool moistened with caustic pyrozone. This restored the colour absolutely.

It may be found, however, that the staining is of such a nature as to resist treatment by the method just explained, when recourse must be had to *cataphoresis*.

It is found that if the two terminals (electrodes) of an electric circuit are placed in a solution capable of transmitting the current, the solution will undergo partial decomposition into various bodies (*ions*\*), some of which tend to collect at the positive (*an-ions*) and others (*cat-ions*) at the negative electrode. The decomposition is called electrolysis, and the passage of the *ions* to the negative electrode *cataphoresis*, and to the positive electrode *anaphoresis*.

In dentistry *cataphoresis* has become applied to the whole process.

In order to induce any element or drug to penetrate dentine it is necessary to—

1. Insulate (electrically) the tooth, or the part of it which is to be acted upon.

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\* Ion = one of the elements of a compound body undergoing electrolisation, and may be either a simple atom or a complex molecule.



2. Place a suitable solution (one capable of conducting electricity and decomposing into suitable ions) in contact with it.

3. Place one electrode in the solution (which, according as the an-ion or cat-ion is to be driven in) and the other on some other part of the body (that is, in connection with the root of the tooth, the fluids of the body being electrical conductors).

4. Apply an electric current of sufficient intensity (*voltage*) to overcome the resistance (stated in *ohms*) of the wires, solutions, dentine, and body fluids, and so cause a flow of electricity (stated in *milli-amperes*) and penetration of the drug.

In order to prevent accidents and pain, and to be able to intelligently control the action, it is necessary to have—

5. A controllable resistance (*rheostat*) to regulate the amount of the current admitted and a gauge (*millammeter*) to measure the amount of current passing at any time.

The great objections to cataphoresis as a practical means of producing anæsthesia, disinfecting or bleaching teeth, are the difficulties, in some cases, of properly insulating the tooth, and the time taken to produce a full effect. The time is considerable, from five to forty-five minutes.

The procedure is the same as regards thorough insulation and preliminary preparation, but caustic pyrozone, being a bad conductor of electricity, must be converted into an aqueous one by agitating two volumes of caustic pyrozone with one volume of distilled water, driving off the ether with gentle heat; 1% of zinc sulphate may be added to improve the conductivity of the solution.

As oxygen is an an-ion, the negative pole must be placed in the tooth and the positive in the patient's hand. (The reverse order is observed when cocaine



anæsthesia is induced.) The current being turned on, the pyrozone is decomposed, and the oxygen tends to seek the positive pole, and so is caused to penetrate the tooth substance.

It is to be noted that often the effect of caustic pyrozone is not immediate. The operator, after an application lasting some time, may be disappointed at not noticing any radical change in colour, but if the patient is seen after an interval of twenty-four hours a very surprising alteration will be observed.

In opening tubes of pyrozone the makers recommend that the tubes be wrapped in a wet towel, as the warmth of the hand is sufficient to boil the ether and cause a dangerous pressure to develop. In spite of this precaution and the immersion of the tubes in ice-cold water, I have often lost the whole contents by the shattering of the glass when the end of the tube is broken off. The plan I adopt now, and by means of which the whole contents are preserved, is to cool the tube by immersion in water, place it in an empty jug, cover this with a thickly folded damp serviette, and break the tube by the pressure of some suitable instrument inserted by the side of the serviette. The fluid should then be decanted into a dry bottle and tightly stoppered.

Some observers have stated that the bleaching process seems to make dead teeth more brittle. I do not know that this is actually so. It must be remembered that any unbleached dead tooth, from the changes which take place after death of the pulp, is brittle; and in my opinion the saturation of the cavity with a varnish, which by capillary attraction tends to fill the tubuli, must have some effect in binding the tooth substance together and so strengthening it.

**Teeth discoloured by metallic stains, such as amalgams.**—These are much more difficult to treat, but the attempt to bleach such should be made if they are very unsightly, and the following methods may sometimes lead to successful results.



Different stains will require different treatment, but fortunately most of the metallic discolorations met with in the mouth are due to a comparatively small number of metals. The chief stains are due to the presence of silver, copper, iron, or occasionally perhaps of nickel.

The chemical process involved is the conversion of the metallic salts into their respective iodides or chlorides, and should the resulting salts be such as are soluble in water, they may be removed by continued flushing of the cavity with hot water. Should the resulting iodides or chlorides be insoluble in water, the attempt must be made to remove them with some suitable chemical solvent. Gold, copper, nickel, and iron give soluble chlorides. Silver and mercury require to be chemically treated. The silver chloride is dissolved out by means of a solution of sodium hyposulphite. In the case of mercury a saturated solution of potassium iodide should be tried. A thorough final washing with hot water is absolutely necessary.

The stains of potassium permanganate can be removed by the ordinary method with caustic pyrozone or sodium sulphite.

Various ways have been suggested for the application of the chlorine and iodine methods for removal of stains, but in practice I have found the results uncertain, and have confined myself to the method described by Dr. Trueman. This consists in packing good, dry chlorinated lime into the cavity, saturating it with a 5% solution of acetic acid and sealing it in with gutta-percha for forty-eight hours, repeating if necessary. The use of metallic instruments is contra-indicated, there being a risk of the formation of soluble chlorides, which might still further impair the colour. Before filling, the cavity must be very thoroughly washed with hot water.



## THERAPEUTIC INDEX.

In the following an attempt has been made to briefly indicate, opposite the diseases most commonly met with in dental practice, the most useful methods of treatment in each. Diseases of which the treatment is purely surgical are omitted; and where surgical treatment is used in conjunction with other means, or as an alternative, its application is indicated by the word **Surgical**.

**Prev.** Preventive or prophylactic treatment.

**Rem.** Remedial or curative treatment.

### ABRASION OF TEETH.

*Prev.* Avoid gritty tooth-powders and metal tooth-picks.

Dentures with clasps or wires to be carefully fitted.

### ABSCESS. See ALVEOLAR ABSCESS.

### ACIDITY OF ORAL CAVITY.

*Prev.* Cleanliness, antiseptics (p. 60); treat diseases on which dependent.

*Rem.* Antacids (p. 83).

### ALVEOLAR ABSCESS.

*Prev.* Remove cause on which dependent; counter-irritants (p. 27); heat (p. 27).

*Rem.* Fomentations; **surgical** (*open and drain*).

*After treatment.* Antiseptic mouth-washes.

### ANÆMIA. General tonic measures (p. 137); purgatives (p. 128); Iron, Arsenic.

### ANTRUM, Disease of. See INFLAMMATION, acute and chronic.

APHTHÆ. See THRUSH.

APHTHOUS STOMATITIS.

*Rem.* Cleanliness ; Glycerinum or Mel Boracis.

ARSENIC, Pain from application of.

*Prev.* Care in application (p. 15).

*Rem.* Phenacetin, Antipyrin, Iodine, Opium.

BLEACHING. See DISCOLORATION.

CALCULUS.

*Prev.* Stop excessive use of alkaline washes, tooth powders and pastes.

*Rem.* Surgical ; Aromatic Sulphuric Acid.

CANCER ORIS.

*Rem.* Surgical ; cauterise with strong nitric acid, stimulants (p. 146).

CARIES OF BONE.

*Rem.* Treat disease on which dependent ; surgical, antiseptics (p. 60), tonics (p. 137).

CARIES OF TEETH.

*Prev.* Cleanliness, treatment of irregularities ; treat constitutional disease, antacids (p. 83), antiseptics (p. 60).

*Rem.* Surgical (*excision, filling*). Silver Nitrate, Alcohol.

CHANCER.

*Rem.* Black wash, Iodoform (*locally*), mercurials, iodides.

CHRONIC INFLAMMATION OF PULP. See PULP.

CHRONIC INFLAMMATION OF MUCOUS SURFACES.

*Rem.* Remove cause ; astringent mouth-wash or applications (p. 31), demulcents (p. 109).



## DENTITION, DISORDERS OF FIRST.

*Rem.* Surgical, Purgatives (p. 128), Chlorate of Potash, Glycerinum Boracis. General medical treatment.

## DISCOLORATION OF ENAMEL.

*Rem.* Detergents.

## DISCOLORATION OF DENTINE.

*Prev.* Surgical.

*Rem.* Surgical, bleaching agents (pp. 121, 210), white fillings.

DRYNESS OF MOUTH. Demulcents, sialagogues (p. 106).

DYSPEPSIA. See ACIDITY.

## EROSION.

*Prev.* As for ABRASION.

*Rem.* Alcohol, Tannin, Silver Nitrate. Surgical.

## EXOSTOSIS.

*Rem.* Iodine (locally), salicylates, iodides (internally). Surgical.

FACIAL NEURALGIA. See NEURALGIA.

FEVER. See PYREXIA.

## FOLLICULAR STOMATITIS.

*Rem.* Potassium chlorate; (*severe*) touch with Copper Sulphate or Silver Nitrate; purgatives (p. 135), tonics (p. 137).

## FETOR OF BREATH.

*Rem.* Remove cause; deodorant mouth-wash (p. 62), Potassium Permanganate; aromatics (p. 113).

## FRACTURE OF JAW.

*Rem.* Surgical; antiseptic mouth-wash (p. 76).

GANGRENOUS STOMATITIS. See CANCRUM ORIS.

## GINGIVITIS, ACUTE.

*Rem.* Fomentations, antiseptics (p. 60), local sedatives (p. 89).

Surgical.

## GINGIVITIS, CHRONIC.

*Rem.* Remove cause, astringents (p. 31), Tannin, Alcohol (*Eau de Cologne*).

## GINGIVITIS, SCORBUTIC. See SCURVY.

## GLANDS, LYMPHATIC, ACUTE INFLAMMATION OF.

*Rem.* Remove cause, fomentations; Belladonna and Glycerine liniment.

Surgical.

## GLOSSITIS, CHRONIC SUPERFICIAL.

*Rem.* Demulcents (p. 109), caustics (p. 12).

## GREEN STAIN.

*Rem.* Detergents (p. 115), Trichloracetic Acid.

## GUM, POLYPUS OF.

*Rem.* Surgical. Potassa cum Calce, Ethylate of Sodium.

## GUM, RECESSION OF.

*Prev.* Soft brush, no powder, remove tartar.

*Rem.* Remove cause, massage (p. 32), stimulants (p. 32).

## GUMS, SPONGY, AND INFLAMMATION OF. See GINGIVITIS.

## HÆMOPHILIA, HÆMORRHAGE DUE TO.

*Prev.* Calcium Salts, Ergot.

*Rem.* Surgical. Styptics (p. 48), Supra-renal Extract, Ergot, Calcium Salts.



## HÆMORRHAGE.

*Rem.* Surgical, heat and cold (p. 48), styptics (p. 48) (*as last resort*).

## HYPERSENSITIVENESS OF DENTINE.

*Rem.* Dry thoroughly; Oil of Cloves, Absolute Alcohol, Camphor, Menthol, Silver Nitrate, Zinc Chloride, Cocaine Cataphoresis, Carbolic, Arsenic; protection, cold.

## HYPERSENSITIVENESS OF PALATE AND FAUCES.

*Rem.* Inhalation of vapour of Spt. Camphor; Cocaine spray, Carbolic (1 in 60 solution).

## INFLAMMATION, ACUTE.

*Rem.* Remove cause, rest, heat or cold (p. 90), counter-irritants (p. 27) or local sedatives (p. 89). Surgical.

## INFLAMMATION, CHRONIC.

*Rem.* Remove cause; surgical, astringents (p. 31); local stimulants (p. 32); caustics (p. 12).

## IRRITATION OF PULP.

*Prev.* As for caries: non-conducting fillings.

*Rem.* Surgical. Local sedatives (p. 89); Oil of Cloves.

## LEUCOPLAKIA.

Demulcents (p. 109); antisyphilitic remedies (p. 153).

## MERCURIAL STOMATITIS.

Surgical, antiseptics (p. 60); discontinue drug.

## MEMBRANOUS STOMATITIS.

Copper Sulphate, Glycerinum, Boracis.

## MUCOUS TUBERCLES.

*Rem.* (*Locally*). Black wash, astringents (p. 31); (*constitutional*) see SYPHILIS.

## NAUSEA.

*Rem.* Sp. Camphor, Cocaine spray, Carbolic (1 in 60).

## NECROSIS OF JAW.

*Rem.* Surgical, antiseptics (p. 60) ; tonics (p. 137).

## NEURALGIA.

*Rem.* Surgical, local anodynes (p. 89), counter-irritants (p. 27), heat (p. 90) ; faradism, tonic treatment (p. 137), analgesics (p. 159), or general sedatives (p. 169).

## ODONTALGIA.

*Prev.* As for caries, and causes. See ALVEOLAR ABSCESS, PULP INFLAMMATION AND IRRITATION, EXOSTOSIS.

*Rem.* Analgesics (p. 159), local anodynes (p. 89).

## ODONTITIS INFANTUM.

*Rem.* Purgatives (p. 128), Potassium Chlorate.

## PAIN AFTER EXTRACTION.

*Prev.* Surgical.

*Rem.* Surgical. Warm mouth-wash, anodyne mouth-wash (p. 99). Carbolic (1 in 40) to socket.

PAIN FROM ERUPTING TEETH. Surgical, antiseptics (p. 60), astringents (p. 31).

PERIOSTITIS. (*Pericementitis*.)

*Prev.* Disinfect roots ; surgical.

*Rem.* Heat, counter-irritants (p. 27), Aconite and Iodine, local sedatives (p. 89). Surgical.

PHAGÆDENIC ULCERATION. Surgical, caustics (p. 12), stimulants (p. 146).

## PHOSPHORUS NECROSIS.

*Prev.* Fill carious teeth, cleanliness.

*Rem.* As for NECROSIS, tonics (p. 137), remove from cause.



POISONING, ACUTE. General principles of treatment.

1. *Remove* as much of poison as possible. Wash out stomach (except in case of corrosives). Emetics (see General Index).
2. Give *chemical* antidote where such exists.
3. Give *physiological* antidote.
4. *Treat symptoms* as they arise.

PULP, EXPOSURE OF.

*Rem.* Devitalisation (see General Index), capping with Oxysulphate of Zinc combined with local sedatives (p. 89).

PULP, ACUTE OR CHRONIC INFLAMMATION OF.

*Rem.* Devitalise (p. 15). (*Palliative*), Carbolic, Menthol, Morphine, Creosote, counter-irritants (p. 27), Phenacetin.

PULP, POLYPUS OF.

*Rem.* Surgical, Potassa cum Calce, Arsenic.

PTYALISM. See SALIVATION.

PYORRHOEA ALVEOLARIS.

*Prev.* Cleanliness, removal of calculus, avoidance of irritation by plates, &c., constitutional.

*Rem.* Surgical, Copper Sulphate, Aromatic Sulphuric Acid, astringents (p. 31).

PYREXIA.

*Rem.* Remove cause, purgatives (p. 128), antipyretics (p. 161); (*severe*) application of cold.

RANULA. Surgical, iodine.

RECESSION OF GUM. See GUMS.

RHEUMATISM. Salicylates, Iodides, Arsenic.

## ROOTS, SEPTIC.

*Rem.* Surgical, Peroxide of Hydrogen, Peroxide of Sodium ; dress with disinfectant (p. 60) ; Iodol, Beta-Naphthol.

## SALIVATION.

*Rem.* Remove cause, antisialagogues (p. 106).

## SCURVY.

*Prev.* Supply of fresh vegetables, Succus Limonis.

*Rem.* Tonics, antiseptic mouth-wash (p. 76) ; astringents (p. 36) ; Succus Limonis.

SENSITIVE DENTINE. See HYPERSENSITIVENESS.

STOMATITIS. See APHTHOUS, FOLLICULAR, PHAGEDÆNIC, ULCERATIVE.

## SUPPURATION LONG CONTINUED.

*Rem.* (*Local*) stimulants (p. 32), astringents (p. 31) ; (*constitutional*) tonics (p. 137).

## SYNCOPE.

*Rem.* Recumbent position or lower head, stimulants (p. 146) ; Alcohol, Ether, Ammonia to nose, warmth, friction.

## SYPHILIS.

*Rem.* Mercurials, iodides, tonics (p. 137), and local treatment.

TEETHING. See DENTITION DISORDERS, PAIN FROM ERUPTION.

TARTAR. See CALCULUS.

## THRUSH (APHTHÆ).

*Rem.* Remove fungus by swabbing, Glycerinum or Mel Boracis ; (*severe*), touch spots with Nitrate of Silver.

TONGUE, CHRONIC INFLAMMATION OF. See GLOSSITIS.



## TONGUE, SIMPLE ULCERATION OF.

*Rem.* Remove cause, Chlorate of Potash mouth-wash, astringents (p. 31).

## TONGUE, SYPHILITIC ULCERATION OF.

*Rem.* Antisyphilitic medicines (pp. 156, 157), iodides.

## TRIGEMINAL NEURALGIA. See NEURALGIA.

## TRISMUS, SPASMODIC.

*Rem.* Remove cause. (*Temporary*) general anæsthetic (p. 175).

## ULCERATIVE STOMATITIS.

*Rem.* Cleanliness, remove cause of irritation, astringents (p. 31), Potassium Chlorate, antiseptics (p. 60), tonics (p. 137).

## GENERAL INDEX.

The thick type denotes the principal notice of a drug, and where its *Materia Medica* and *Toxicology* will be found.

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