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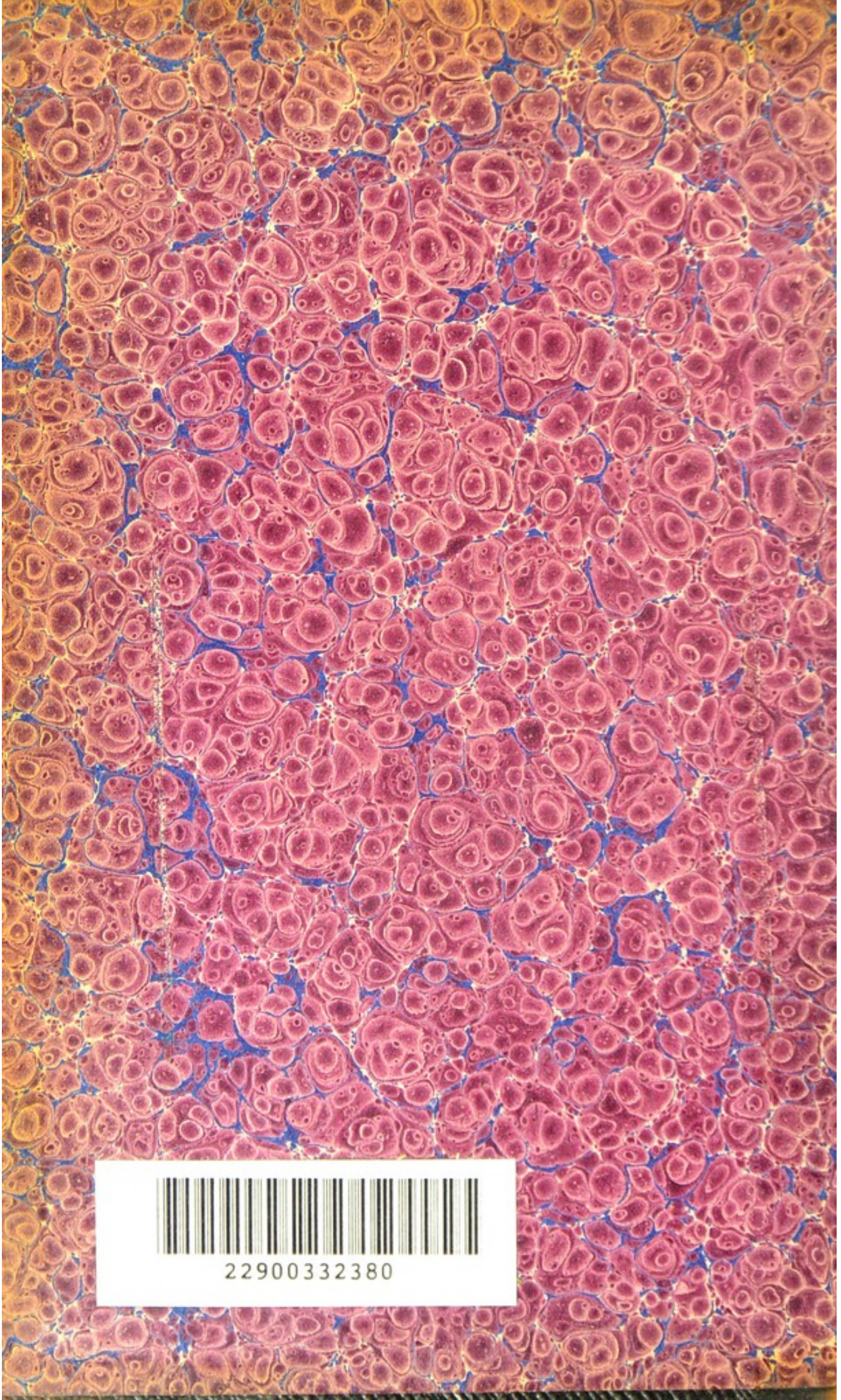
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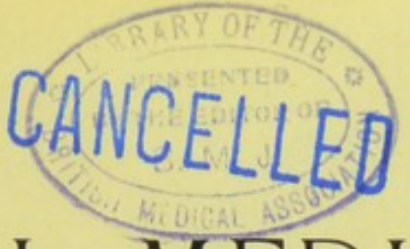

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DENTAL MEDICINE

A MANUAL OF DENTAL MATERIA MEDICA AND THERAPEUTICS

BY

FERDINAND J. S. GORGAS, A.M., M.D., D.D.S

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PREFACE TO THE EIGHTH EDITION

In presenting the Eighth Edition of the "Dental Medicine" to practitioners and students of dentistry, the author has endeavored to further improve a treatise which has, in the case of former editions, been so favorably received by the profession and adopted by many of the large dental institutions as a text-book.

A work of this character should, as far as possible, be a complete as well as a practical exposition of the source or derivation, properties, physiological action, and dental uses of the various drugs employed in the practice of dentistry, as well as their methods of application and administration.

Since the appearance of the Seventh Edition, a number of drugs and their combinations have been introduced and many of them appear to be valuable additions to the dental materia medica. It has been the aim of the author, in preparing this new edition, to refer to the most important of these in order that the usefulness of this work as a text-book and a book of reference may be increased.

Among the large number of additions are chapters on Prescription Writing and Anesthesia, together with such new agents, their properties and therapeutics, as are at the present time employed in the practice of dentistry. Among this number are Somnoform, Adrenalin Chloride, Nervocidine, Codrenin, Argyrol, Acetone, Novocaine, Alkathymol, etc., etc., etc. A new "Table of Doses of Medicinal Agents" has been substituted for the one in the former edition and valuable additions made to the dental formulæ.

FERDINAND J. S. GORGAS.

HAMILTON TERRACE, BALTIMORE, MD.

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PREFACE TO THE FIRST EDITION

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

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

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

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

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

FERDINAND J. S. GORGAS.

HAMILTON TERRACE, BALTIMORE, MD.

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DENTAL MEDICINE.

DEFINITION OF SUBJECTS.

Materia Medica is that branch of medical science which refers to and describes the methods and substances known as "medicinal agents," which are employed in the prevention and treatment of disease; also their source or derivation, preparation, composition, and properties.

Therapeutics is that branch of medical science which comprises the doctrine of the management of disease. Generally, however, the term is restricted to a description of the *modus operandi* of medicines, or, in other words, their use, application, effects, and doses, when applied in the treatment of various morbid conditions.

Pharmacology is the science of the action of medicines, and is expressed by what is termed their "physiological action" upon the tissues and functions of the body.

Pharmacy is the art of preparing medicines, and dispensing them by direction of the therapeutist.

Toxicology is the science or study of poisons—their symptoms and antidotes.

Pathology is the science which treats of the changes of functions and changes in structure caused by disease.

An accurate knowledge of the principles and rules which govern the administration and action of medicinal substances enables the practitioner to restore disordered functions, and to so impress the organism as to maintain harmonious conditions, by means of which the various functions, in a state of health, are intimately connected by relation and sympathy.

Some medicinal agents exert their influence on primary nourishment, converting food, by digestion, into the substance of

organic beings, while other remedies, without interfering with digestion, by a modification of the process of assimilation exert a destructive influence upon the tissues. Some medicinal agents affect the nervous system, and others are so irritant in their effects as to cause their speedy expulsion; while others, again, have a particular affinity for certain organs, and are eliminated by them, the effect ceasing as soon as the evacuation is completed. Other medicinal agents prevent septic decomposition, and the growth of micro-organisms.

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

The methods of treatment which have for their objects the prevention, and relief of pain, and the cure of disease, include *preventive* or *prophylactic* treatment, which embraces all hygienic conditions which will obviate any tendency to disease, prevent its extending to others, and the employment of antiseptic agents; for example, in dental practice attention to the hygiene of the oral cavity, which consists in keeping the teeth and associate parts clean, and preventing dental caries, and affections of the oral mucous membrane: also *palliative* treatment, which affords relief from pain, such as that of odontalgia, neuralgia of dental origin, etc.; also *curative* treatment, which eradicates the disease completely; for example, in dental practice the proper preparation and filling of carious cavities, the cure of alveolar abscesses, alveolar pyorrhœa, etc.

The indications for treatment will depend upon the nature and location of the affection, and the symptoms present. The condition of vital organs, such as the heart, lungs, and kidneys, also influences the treatment; for example, in the administration of anæsthetics.

Medicines enter the circulation by either *external* application or *internal* administration. Externally by such methods as the *epidermic*, or by inunction—the application of medicines to the skin by rubbing or friction; the *en-epidermic*,—the application of plasters, poultices, lotions, etc., to the skin; the *endermic*,—the application of a blister, which is followed by that of a medicine to the raw surface thus produced; the *hypodermic*,—the injection of medicines into the skin and mucous membrane to obtain a more

rapid effect than when administered by the mouth internally. Internally, *by the mouth; by inhalation; by the rectum*, when it is inadvisable to administer them by the mouth.

The changes which medicines undergo when taken into the system depend upon the condition of the system, the temperature of the body, the food and drink, and the tendency of medicines to combine with other substances and form different compounds. The rapidity with which medicines enter the circulating fluid is governed by their composition. The crystalloid substances pass into the blood very readily, while colloid substances enter slowly, or not at all. Arsenious acid is an example of the crystalloid. Corrosive poisons not only destroy life, but also the parts with which they come in contact, while other poisons destroy life alone. The blood conveys medicines to different parts of the body, and during such a passage they change the character and composition of the blood, and are eliminated from the system by the excretory organs, such as the lungs, kidneys, skin, urinary and salivary organs. The form in which medicines are administered and applied, also modify their effects.

The action of drugs is also modified by pharmaceutical combination, as the joint effect of two medicines is different from that one of them may cause, for opium given with mercury will prevent the purgative action of the mercury. The action of medicines may be direct so as to produce local effects; or it may be general or indirect when the entire body, or remote organs are affected. A large number of medicines operate physically on the body and affect remote parts through the agency of the nervous system; among such are electricity, cold, heat, mechanical irritants, etc., which affect remote parts by the influence of the cerebro-spinal and ganglionic systems. The afferent or sensory nerves convey impressions to the nerve-centre, and the efferent or motor nerves transmit impressions from the centre to muscles, vessels, glands, etc., and the effects of medicines are transmitted to the brain, producing an excitement of a nerve-centre and a reflex action is carried along the efferent nerves, producing certain symptoms. The effects of medicines are modified by the age of the patient, as young children require small doses as a general rule; by the sex, as females possess greater susceptibility of the nervous system, and more excitability of the vascular

system than males; they have also less energy, and medicines act on them more powerfully and rapidly and for a less period than on males; also climate influences the effects of medicines, as some, such as narcotics for example, act more energetically in hot climates, and others less energetically, calomel for example; habit also influences the action of medicines, as some become inert after long continued use; also diseased conditions modify the effects of medicines, such as mercury in fevers; the idiosyncrasy also, as is shown by the effects manifested in different individuals; mercury for example will cause profuse salivation in susceptible patients when a very small quantity is administered; also the mind, as the cheerful convalesce sooner than the despondent.

Some medicines have a specific action on certain tissues and organs of the body,—as alcohol on the brain, strychnine on the spinal cord.

Temperaments are peculiarities of organization characterizing the different classes of individuals, the nervous patient being more easily affected by medicinal, than he is by other agencies, while the phlegmatic patient is not.

Idiosyncrasies are peculiarities belonging to single individuals, and they are so numerous that a knowledge of them is important for the practitioner.

TABLES FOR PREPARING PERCENTAGE SOLUTIONS.

The following tables of Dr. Sherrard, Ph. C., are simple and require but little explanation. The first table gives percentage solutions, as, for instance, 4 per cent. cocaine muriate solution; the second table gives parts in 1,000 or 5,000, as, for instance, corrosive sublimate 1 in 1,000. The use of the first table is as follows: Run down column 1 until the correct percentage wanted is found, then move to the right along the line until the column is found giving the amount of the fluid measure to be made up; at the intersection will be found the weight of the salt required. For example, suppose it is desired to make 4 fl. oz. of 4 per cent. cocaine muriate solution, run down the left-hand column to 4, then along to the right till the column headed 4 fl. oz. is reached. At the intersection of the two will be found

72,912, and this is the number of grains needed. It must be remembered that this is the amount of *water* to take, and not q. s. water to make the volume, and also that these tables are true only for water, and not for alcohol, or any other fluid. The second table is similarly employed. If other amounts of a solution are required than those given in the tables, a simple mathematical calculation will determine the amount of drug or salt required for a specified amount of solution. For example, if 8 fluid ounces of a four per cent. solution is required, follow down the 4 fluid ounce column until opposite 4 per cent.; the number of grains required are 72,912. Now, to make 8 fluid ounces, just twice as much (145, 824 grs.) is required. For all dispensing and administering purposes in any prescribed doses, the figures thus given are correct. It is therefore clear that if a drachm of a 2 per cent. solution be prescribed, exactly 2 per cent. of that drachm is the salt in the solution, the other 98 per cent. being the water.

FOR MAKING ANY QUANTITY OF PERCENTAGE SOLUTIONS.

To make	For each 1 fl. oz. of water take of the drug or salt.	For each 2 fl. ozs. of water take of the drug or salt.	For each 3 fl. ozs. of water take of the drug or salt.	For each 4 fl. ozs. of water take of the drug or salt.	For each 5 fl. ozs. of water take of the drug or salt.	For each 10 fl. ozs. of water take of the drug or salt.	For each 16 fl. ozs. of water take of the drug or salt.
	Grains	Grains	Grains	Grains	Grains	Grains	Grains
1 per cent. . . .	4.557	9.114	13.671	18.228	22.785	45.57	72.912
2 per cent. . . .	9.114	18.228	27.342	36.456	45.570	91.14	145.824
3 per cent. . . .	13.671	27.352	41.013	54.684	68.355	136.71	218.416
4 per cent. . . .	18.228	36.456	54.6 4	72.912	91.14	182.28	291.648
5 per cent. . . .	22.785	45.57	68.355	91.14	113.925	227.85	364.56
10 per cent. . . .	45.57	91.14	136.71	182.28	227.85	455.7	729.12
15 per cent. . . .	68.355	136.71	205.065	273.42	341.775	683.55	1093.68
20 per cent. . . .	91.14	182.28	273.42	364.56	455.70	911.4	1458.24
25 per cent. . . .	113.925	227.85	341.775	455.70	569.625	1139.25	1822.80
40 per cent. . . .	182.28	364.56	546.84	729.12	911.4	1822.8	2916.48

FOR MAKING ANY QUANTITY OF SOLUTION WHEN STATED IN PARTS PER THOUSAND, HUNDRED, ETC.

To make a solution of	For each 1 fl. oz. of water take of the drug or salt.	For each 2 fl. ozs. of water take of the drug or salt.	For each 3 fl. ozs. of water take of the drug or salt.	For each 4 fl. ozs. of water take of the drug or salt.	For each 5 fl. ozs. of water take of the drug or salt.	For each 10 fl. ozs. of water take of the drug or salt.	For each 15 fl. ozs. of water take of the drug or salt.
	Grains	Grains	Grains	Grains	Grains	Grains	Grains
1 in 1000 . . .	.4557	.9114	1.3671	1.8228	2.278	4.557	7.291
1 in 500 . . .	.9114	1.8228	2.7312	3.6456	4.557	9.114	14.582
1 in 400 . . .	1.139	2.278	3.4177	4.557	5.695	11.392	18.228
1 in 300 . . .	1.519	3.035	4.557	6.076	7.59	15.19	24.304
1 in 200 . . .	2.2785	4.557	6.8355	9.114	11.39	22.785	36.456
1 in 100 . . .	4.557	9.114	13.671	18.228	22.785	45.57	72.912
1 in 50	9.114	18.228	27.342	36.456	45.57	91.14	145.824
1 in 25	18.228	36.456	54.684	72.912	91.14	182.28	291.648
1 in 10	45.570	91.140	136.710	182.280	227.85	455.70	729.120
1 in 5	91.14	182.28	273.42	364.56	455.7	911.4	1458.24

The rule for finding the amount of a drug in a given percentage of solution is as follows:

Find the number of minims in stated quantity, and multiply this by the numbers indicating percentage, placing the decimal two points to the left.

Examples: 1. How many grains of drug in 2 fluid ounces of a 2 per cent. tincture (solution)? Two fluid ounces = 960 (♏) × (2 p. c.) = 19.20 grains. 2. How many grains of a drug in 100 C.C. of a 4 (p. c.) tincture (solution)? 100 C.C. × 16.23 = 1623.00 (♏) × 4 (p. c.) = 64.92 grains.

ABBREVIATIONS.

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

ABBREVIATION.	LATIN WORD.	ENGLISH WORD.
A,	Argon. Anterior. Anode,	
A.C.C.,	Anodal closure contraction,	
āā,	Ana (G.),	Of each.
Ad.,	Add,	
Ad saturand.,	Ad saturandum,	Until saturated.
Ad lib.,	Ad libitum,	At pleasure.

ABBREVIATION.	LATIN WORD.	ENGLISH.
Amp.,	Aqua,	Water.
Aq.,	Ampere,	
Aq. tepid.,	Aqua tepida,	Warm water.
Aq. ferv.,	Aqua fervens,	Hot water.
Aq. dest.,	Aqua destillata,	Distilled water.
At. wt.,	Atomic weight,	
C. or Cong.,	Congius,	A gallon.
Chart.,	Chartula,	A small paper.
Coch.,	Cochlear,	A spoonful.
Coch. mag.,	Cochlear magnum,	A tablespoonful.
Coch. parv.,	Cochlear parvum,	A teaspoonful.
Colent.,	Colentur,	Let them be strained.
Collyr.,	Collyrium,	An eye-water.
Comp.,	Compositus,	Compound.
Contus.,	Contusus,	Bruised or broken.
Cort.,	Cortex,	Bark.
Ext.,	Extractum,	An extract.
F. or Ft.,	Fiat vel fiant,	Let them be made.
Fol.,	Folium vel folia,	A leaf or leaves.
Garg.,	Gargarysma,	A gargle.
Gr.,	Granum vel grana,	A grain or grains.
Gtt.,	Gutta vel guttæ,	A drop or drops.
Haust.,	Haustus,	A draught.
Infus.,	Infusum,	An infusion.
M.,	Misce,	Mix.
Mass.,	Massa,	A mass.
Mist.,	Mistura,	A mixture.
O.,	Octarius,	A pint.
Pil.,	Pilula vel pilulæ,	A pill or pills.
Pulv.,	Pulvis vel pulveres,	A powder or powders.
q. s.,	Quantum sufficit,	A sufficient quantity.
℞.,	Recipe,	Take.
Rad.,	Radix,	A root.
S.,	Signa,	Write or give directions.
Spts.,	Spiritus,	Spirits.
ss.,	Semis,	The half.
Syr.,	Syrupus,	Syrup.
Tinct.,	Tinctura,	A tincture.
lb.,	Libra,	A pound.
℥,	Uncia,	An ounce.
ʒ,	Drachma,	A drachm.
℈,	Scrupulus,	A scruple.
f℥,	Fluiduncia,	A fluid ounce.
fʒ,	Fluidrachma,	A fluid drachm.
♏.	Minim,	A drop.

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

But there is a wide difference between a drop and a minim, and although a drop is usually considered as one-sixtieth part of a fluidrachm, this is only true of water and some other liquids, and drops of the same liquid vary under different circumstances. Specific gravity, viscidity or adhesiveness, and mobility modify the size of drops. The heavier the liquid the smaller will be the drops, and the greater number in a given measure.

The drops from a thick-lipped bottle are larger than those from one having thin lips; and drops from a full bottle are generally smaller than those from a bottle partially filled, on account of rapidity of movement. The adhesiveness of a liquid to the sides of a bottle increases the size of the drops, as a greater mass is necessary to overcome the viscidity. Drops are also increased in size by the greater mobility of a liquid.

A *tablespoonful* of any liquid is regarded as equal to *half an ounce* by measure; and a *teaspoonful* equal to a *fluidrachm;* and such measures are sufficiently accurate where no great precision is requisite.

A gallon contains eight pints.

A pint contains sixteen fluid ounces.

A fluid ounce contains eight fluidrachms.

A fluidrachm contains sixty minims (♏).

A wine glass (approximate measurement) contains two fluid ounces.

A teacup (approximate measurement) contains four fluid ounces.

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

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

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

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

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

MEASURING LIQUIDS BY DROPS.

In measuring liquids by drops, a glass medicine-dropper should be used, as the uncertainty of dropping from various shaped bottles should not be depended upon.

The following list shows the relative differences between drops and minims of a few of the drugs used in dental practice.

Number of Drops in Sixty Minims—

Carbolic Acid	111	Oil Cloves	130
Sulphuric Acid	128	Oil Cinnamon	126
Sulphuric Acid (dilute)	60	Oil Wintergreen	125
Aromatic Sulphuric Acid	146	Oil Peppermint	129
Ether	172	Oil Sassafras	133
Alcohol	146	Oil Turpentine	136
Alcohol (dilute)	137	Aromatic Spts. of Ammonia	142
Aqua Destillatæ	60	Spts. Camphor	143
Aqua Ammonia	64	Syrups	65
Chloroform (purified)	250	Tinct. Aconite	146
Creosote	122	Tinct. Benzoin (Comp.)	148
Fl. Extract of Ergot	133	Tinct. Digitalis	128
Glycerine	67	Tinct. Chloride of Iron	150
Liq. Chloride of Zinc	89	Tinct. Opii	130
Oil Cajeput	134	Vinum Opii	100

FINENESS OF POWDER.

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

A *very fine* powder	Should pass through a sieve having 80 or more meshes to linear inch.	= No. 80 Powder.
A *fine* powder	Should pass through a sieve having 60 meshes to the linear inch.	= No. 60 Powder.
A *moderately fine* powder. .	Should pass through a sieve having 50 meshes to the linear inch.	= No. 50 Powder.
A *moderately coarse* powder .	Should pass through a sieve having 40 meshes to the linear inch.	= No. 40 Powder.
A *coarse* powder	Should pass through a sieve having 20 meshes to the linear inch.	= No. 20 Powder.

WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

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

SCALE OF COMPARISON.

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

TROY WEGHT.

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

SCALE OF COMPARISON.

℔		oz.		dwt.		gr.
1	=	12	=	240	=	5760
		1	=	20	=	480
				1	=	24
				1k.	=	3½

AVOIRDUPOIS WEIGHT.

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

SCALE OF COMPARISON.

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

TABLE FOR CONVERTING APOTHECARIES' WEIGHTS AND MEASURES INTO GRAMS.*

Troy Weight	Metric	Apothecaries' Measure	Grams for Liquids		
Grains	Grams		Lighter† than Water	Specific Gravity‡ of Water	Heavier§ than Water
1/600	.00016	♏ 1	.055	.06	.08
1/300	.00033	2	.10	.12	.15
1/128	.0005	3	.16	.18	.24
1/100	.00065	4	.22	.24	.32
1/64	.001	5	.28	.30	.40
1/40	.0015	6	.32	.36	.48
1/30	.002	7	.38	.42	.55
1/20	.003	8	.45	.50	.65
1/15	.004	9	.50	.55	.73
1/12	.005	10	.55	.60	.80
1/10	.006	15	.80	.72	.96
1/8	.008	16	.90	1.00	1.32
1/6	.010	20	1.12	1.25	1.60
1/4	.016	25	1.40	1.55	2.00
1/3	.02	30	1.70	1.90	2.50
1/2	.03	35	2.00	2.20	2.90
1	.065	40	2.25	2.50	3.30
2	.13	48	2.70	3.00	4.00
3	.20	50	2.80	3.12	4.15
4	.26	60 f℥j	3.40	3.75	5.00
5	.32	72	4.00	4.50	6.00
6	.39	80	4.50	5.00	6.65
8	.52	90	5.10	5.60	7.50
10	.65	96	5.40	6.00	8.00
15	1.00	100	5.60	6.25	8.30
20 ℈j	1.30	120 f℥ij	6.75	7.50	10.00
24	1.50	160	9.00	10.00	13.30
26	1.62	180 f℥iij	10.10	11.25	15.00
30 ℥ss	1.95	240 f℥ss	13.50	15.00	20.00
40	2.60	f℥v	16.90	18.75	25.00
50	3.20	f℥vj	20.25	22.50	30.00
60 ℥j	3.90	f℥vij	23.60	26.25	35.00
120 ℥ij	7.80	f℥j	27.00	30.00	40.00
180	11.65	f℥ij	54.00	60.00	80.00
240 ℨss	15.50	f℥iij	81.00	90.00	120.00
300	19.40	f℥iv	108.00	120.00	160.00
360	23.30	f℥v	135.00	150.00	200.00
420	27.20	f℥vi	162.00	180.00	240.00
480 ℨj	31.10	f℥viij	216.00	240.00	320.00

*From P. Blakiston's Son & Co. Visiting List.

†Lighter than water are tinctures, spirits, compound spirit of ether, sweet spirit of nitre, fixed and volatile oils. Æther Fortior, f℥j=grams 2.80.

‡Same as water are waters, liquids, decoctions, infusions, most fluid extracts and tinctures made with dilute alcohol.

§Heavier than water are syrups, glycerin, a few fluid extracts and chloroform. Of the latter, f℥j=grams 5.50.

THE METRIC OR FRENCH DECIMAL SYSTEM OF WEIGHTS AND MEASURES.

The metric system is based upon the METER, which is the standard unit of *length* of that system, and equal to 39370,432 inches, or about 10 per cent. longer than the yard.

The metric unit of *fluid measure* is the LITER—the cube of 1/10 meter, or 1000 cubic centimeters—equal to about 34 fluid ounces.

The metric unit of *weight* is the GRAM, which represents the weight of one cubic centimeter of water as its maximum density. It is equal to 15 (43,234,874) troy grains.

One CUBIC CENTIMETER is equal to 16,231 minims.

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

We accordingly have—

1 gram equal to 15/1 troy grains.
1 troy grain equal to 1/15 gram.
1 cubic centimeter equal to 1/4 fluidrachm.
1 fluidrachm equal to 4/1 cubic centimeter.

Hence—

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

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

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

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

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

All other terms, and units, and prefixes used in the metric

system, may be wholly ignored by the physician and the pharmacist.*

EXAMPLE OF A METRIC PRESCRIPTION.

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

The use of a decimal line prevents possible errors.

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

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

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

℞	Opii	1 Gm.
	Camphoræ	2 Gm.
	Make 15 pills.	

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

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

*The prefixes are simply numerals, as follows:—

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

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

†As any liquid medicine must necessarily be administered to the patient in *measured*, and not in *weighed*, doses, it will, of course, be more convenient to the physician to continue to make use of fluid measures in writing prescriptions, especially as he is already accustomed to this,

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

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

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

TABLE OF EQUIVALENTS.

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

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

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

RULES FOR REGULATING DOSES.

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

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

The dose for a person of middle age being 1, or 1 drachm,—
That for a person from 14 to 21 years will be 2/3, or 2 scruples.
That for a person from 7 to 14 years will be 1/2, or 1/2 a drachm.
That for a person from 4 to 7 years will be 1/3, or 1 scruple.
That for a child of 4 years will be 1/4, or 15 grains.
That for a child of 3 years will be 1/6, or 10 grains.
That for a child of 2 years will be 1/8, or 8 grains.
That for a child of 1 year will be 1/12, or 5 grains.

The following simple rule by Dr. Young will be found convenient: "For children under twelve years, the doses of most medicines must be diminished in the proportion of the age to the age increased by 12; thus, at two years to 1/7; viz:

$\frac{2}{1+12} = \frac{1.}{7}$ At twenty-one the full dose may be given."

Hence—

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

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

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

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

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

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

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

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

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

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

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

TOPICAL REMEDIES.

Medicinal substances are applied to the mucous membrane of the mouth and to the dental structures almost exclusively for local effects, the object being to confine the effects, when anæsthesia is desired, to the injected area. In dental practice antiseptic remedies are extensively employed to arrest fermentative

and putrefactive processes, as every kind of fermentation depends upon the growth and increase of a living organism. Various diseases of the dental structures have a close relationship with low organisms in the morbid processes which result during their progress, and which are maintained and developed by the presence of living matter. The remedies recognized as belonging to the group of antiseptics, when brought into contact with the disease germs, which are constituted of these organized forms of life, have the power of destroying their vitality and of arresting the fermentative or putrefactive process which they either develop or promote. The effect of escharotics when applied to a part of which the structure and vitality are to be destroyed, is to produce an eschar and incite inflammation and suppuration of the adjacent tissues, by which the slough is separated from the living parts.

Medicinal substances are applied to the mucous membrane of the mouth in the form of gargles or mouth-washes, lotions and injections, and generally for a local effect.

Medicinal substances are applied to the skin for both a local and general effect, either by friction, by the endermic, or by the hypodermic methods. In the *endermic method*, the cuticle is usually removed by the action of a blister, and the medicinal agent is applied to the denuded surface in the form of a powder or ointment, and is a useful method when the irritability of the stomach or difficult deglutition prevents medicines from being taken through the mouth.

Hypodermic Injection.—The *hypodermic method* consists in injecting medicines by means of a graduated syringe with a sharp-pointed nozzle, and constructed for the purpose, into a subcutaneous cellular tissue, thus producing both a local and general effect, and an impression is made much more rapidly than when the medicine is taken into the stomach. It is necessary that the remedy should be applied beneath the skin, or mucous membrane, and that it should not be injected into any large vessel; hence for hypodermic injections a locality should be selected free from nerves, veins, or large vessels, and not the same locality in subsequent injections. The medicinal agents used for hypodermic injections are now prepared in the form of tablets which are perfectly soluble, and of considerable strength in small bulk. They

are dissolved in pure or distilled water at the time the injection is to be made, and great accuracy is thus obtained. Anodynes thus used are more rapid in their effect, and the general rule as regards the quantity is, that in first injections the dose should be, for males, two-thirds of the ordinary dose by the stomach and for females about one-half. It is very necessary that a vein or large vessel should not be punctured when introducing the point of the syringe. The insertion of the deltoid muscle in the arm is generally selected as the place of injection, and the needle-point of the syringe should not be inserted too deep nor at the same point in subsequent injections. Hypodermic injections may also be made in the back, front of thigh—just in front of trochanters, and in the calf of the leg. A graduated syringe is required, and the point of the needle pushed through the skin, or mucous membrane until it works easily in the tissues beneath; then inject slowly, and when withdrawing the point, press the finger firmly over the puncture for a minute, to prevent the fluid escaping. The effects of a medicine are much more rapidly obtained by the hypodermic method than when administered by the mouth. In dental practice this method is employed for the relief of neuralgia, and the pain attending the extraction of teeth; also for the administration of ergot in cases of alveolar hemorrhage. There are two dangers from hypodermic injection—the needle may enter a vein and the entire dose may be carried at once to the vital centres,—the solution or needle used may not be sterile and an abscess be produced.

Different methods are employed for injecting an anæsthetic solution into the gum tissue, when such is used for the painless extraction of teeth and other dental operations. A dental hypodermic outfit consists of one suitable syringe and needles and local anæsthetic hypodermic tablets. The best needles are those sterilized at a temperature of 300° F. for five hours, and securely stoppered in a tube vial. The local anæsthetic may be injected about the root of a tooth or by infiltration near the gum fold; previously to inserting the needle, the mouth should be sterilized by bathing it with an antiseptic solution. The syringe is filled by first drawing the solution up into it, then inverting the instrument and pushing in the piston until the first drop shows itself at the point of the needle. This will expel the air

and prevent its injection into the tissues. To inject the solution about a front tooth, the needle point should be inserted midway between the margin of the gum and the fold of gum above or below at the gum and lip junction. The pain attending the insertion of the point of the needle into the gum tissue may be relieved or altogether prevented by applying to the gum surface for a few minutes a pledget of cotton saturated with the anæsthetic solution. A very sharp-pointed needle will cause little pain; or, as an obtundent, the application of a drop of phenol upon the point of puncture may be made. The syringe should be held in the right hand at an acute angle with the long axis of the tooth, and the left hand employed in holding the lip and cheek aside. The continuous slow movement of the needle when inserting it into the gum tissue will prevent its entering a vein; and after its removal the point of the finger of the operator should be pressed over the puncture, and a period of five to ten minutes elapse before the extraction of the tooth is commenced. The six anterior teeth (incisors and cuspids) require an injection on the labial surface only; while the bicuspids and molars require a buccal and palatal or lingual injection. The inferior molars present the greatest difficulty in the hypodermic method, and the plan advised is to inject the anæsthetic on the buccal surface into the tissue of the gum at its junction with the cheek, holding the syringe in a more horizotal position, and using a curved needle for injecting the fluid in the lingual surface. After injecting, some advise the use of a small drill to penetrate the bone on the buccal surface, repeating the injection through such a hole in the bone. The object in using the needle is to insert its point with the necessary pressure close to the bone. All parts of the syringe should be kept thoroughly sterilized with a 5 per cent. solution of carbolic acid, germicidal soap, or other disinfectant.

Counter-irritants.—Medicinal substances of the classes of rubefacients and epispastics are employed as *counter-irritants*, their effect being to establish external or artificial irritation for the relief or cure of internal inflammation existing in a part or in the body. The extent and character of the counter-irritation thus established should be, in a great measure, regulated by the character of the disease which it is intended to relieve; a rubefacient

being indicated in irritation of mucous membrane, a seton or issue when the disease is of a suppurative character, and a vesicant in inflammation of serous membranes. When the inflammation is superficial, the counter-irritant should be applied at a little distance from the focus of the affection; otherwise the inflammation may be aggravated; on the other hand, if the inflammation is deeply seated, the counter-irritant should be applied directly on the focus of inflammation to induce the blood to flow to the surface.

When a counter-irritant is employed in the case of neuritis or neuralgia, it should be applied directly over the origin or point of exit of the affected nerve. When employed for inflammation on the face and head, the counter-irritant should be applied beneath the chin or back of the neck.

Setons and Issues are employed to produce permanent counter-irritant effects. A seton consists of a skein of silk or a piece of tape or other substance passed through the integument by means of a seton-needle, and allowed to remain, so that a discharge is maintained. A simple seton in the case of an incision into an alveolar abscess, is composed of a single or a double strand of floss silk introduced into the wound made by the lancet, or into the orifice of a fistulous opening, after the pus of the abscess has been evacuated, to maintain a free exit for the pus which may be secreted after the first operation; fine silver wire is also employed for the same purpose. An issue is generally some irritating substance, such as caustic potassa, or a small pea, or piece of orris root introduced in order to maintain a discharge.

Blood-letting is performed for the purpose of lessening vascular excitement, reducing inflammatory action, relieving congestive pain and spasm, promoting absorption, relaxing the muscles and arresting hemorrhage. It is divided into *general* and *local*, general blood-letting consisting of venesection or phlebotomy, the median cephalic or basilic veins of the arm, and occasionally the external jugular and other veins, being the ones selected from which to draw the blood. But it should be resorted to with caution, as it is a powerful and exhausting agent.

Local Blood-letting is chiefly employed for the relief of local inflammation and congestion, and is accomplished by means of leeches, cups, and scarifications.

The leech—*hirudo*—is commonly employed as an agent for local blood-letting, and is preferable to "cupping" in many local and chronic forms of inflammation; also in infantile affections which require such an operation, when the American leech is used, and it makes a smaller incision than the European leech, and draws less blood. A leech is supposed to draw on an average, about a drachm and a half to two drachms of blood before it is removed, and the quantity which subsequently flows will generally equal that drawn by the leech.

Leeches are often applied to the gum over the root of a tooth affected with acute periodontitis, to relieve the inflammation and congestion. To make the leech bite readily, the surface to which it is to be applied may be smeared with cream or sweet milk, or a puncture may be made in it, so as to draw blood, and, to isolate the part of the surface on which it is desired to apply the leech, a small hole may be made in a piece of bibulous paper, which will adhere to a dry surface of the gum, and afford an opening for the mouth of the leech to approach the surface.

To remove a leech if it does not drop off of its own accord which they will generally do in from fifteen to twenty minutes, it may be sprinkled with a little cold water or diluted vinegar, or powdered sugar. To promote bleeding from leech bites, fomentations or warm dry cloths, or a cupping glass, may be used. To check the hemorrhage from leech bites, which is sometimes excessive, firm pressure may be made with the finger, or exposure to cold air, or the application of such styptics as alum or matico, etc. For applying a leech to the surface of the mouth a leech-glass may also be used to confine the body of the leech.

Cupping is employed when it is desired to draw blood rapidly, or to ascertain the exact quantity of blood drawn, or when it is desirable to make an impression on the system. Cupping is performed by means of cupping glasses and a scarification. The glasses are applied after being partially exhausted of air, when the removal of the atmospheric pressure produces a determination of blood to the capillaries of the part, and it is afterwards easily drawn by scarification.

Scarifications consist of small incisions made in inflamed and congested parts, to relieve the engorged condition of the capillary

vessels, and are sometimes employed to relieve acute inflammation of the gums and mucous membrane of the mouth.

Resolution is a term which indicates the return to the normal condition of diseased tissues—for example, the subsidence of inflammation; a process of recovery.

PRESCRIPTION WRITING.

The difference between the old method of prescription writing and modern prescribing is well illustrated by the unpalatable and even nauseous drug mixtures being substituted by the present use of pleasing and palatable combinations of sweetened aromatic and spirituous preparations containing active medicinal substances. To the manufacturing pharmacist is greatly due the credit of this improvement. Much of the irritation or want of toleration following the administration of certain drugs may be avoided by giving them a more pleasant vehicle. Almost any prescription may be improved in its physical properties by an attractive color and pleasant taste by such adjuncts as exert a peculiar protective action upon the gastric mucous membrane and promote prompt absorption. The iodides, bromides, salicylates, etc., are examples of drugs where the unpleasant taste and irritating effects may be successfully covered and prevented. There is also a very apparent difference between old and modern prescriptions in respect to accuracy and simplicity. The word *prescription* is defined as a written order or direction to the pharmacist for compounding and dispensing a medicinal substance or drug, and consists of several parts, as follows: *The Superscription*, which consists of a single character ℞, the initial letter of the Latin word *recipe*, meaning take thou. *The Inscription*, which is the most important part of the prescription, on account of its containing the names and quantities of the ingredients of the medicine indicated. The names of the medicines are written in abbreviated form, and the quantities are indicated by symbols, such as gr., ℈, ʒ, ℥, and Roman numerals, except in metric prescriptions in which the quantities are designated by Arabic numerals, divided by the decimal point and after followed by such signs Gm. or C.C. The inscription is conveniently subdivided into several parts accord-

ing to the value of the several ingredients: viz., the *basis* or principal active agent; the *adjuvant* or agent second in importance and intended to aid the basis; the *corrective* intended to modify the action of both the basis and the adjuvant and, finally, the *vehicle*, or *diluent*, which is employed to provide a convenient and pleasing form of administration. Every prescription, however, may not consist of these four divisions, for at times the basis and vehicle alone, or even the basis only may be prescribed.

The subscription which is designed to give directions to the compounder of the prescription regarding the manner in which the medicine is to be taken, whether in a divided dose or as a whole. These directions consist sometimes of a single letter, for example; M. for *misce;* F. for *fiat,* or S. for solve; or a combination of abbreviations, as *Ft. mist* for *fiat mistura; Ft. pulv.* for *fiat pulvis; Ft. sol.* for *fiat solutio*, etc.

The subscription, however, may be so incomplete as to be unintelligible unless the missing portion is supplied mentally; for instance *Ft. Chart,* X when it is intended that the medicine be divided into 10 powders; but literally translated this subscription would read, 10 *papers* may be made (*fiant chartæ decem*). The missing portion to be supplied may be *p. et div. in*, and if added to the above abbreviations would cause the same to read *fiat pulvis et divide in chartas X*, or *let a powder be made and divide into* 10 *papers.* Hence, to read prescriptions intelligently, and write the abbreviated names and terms out in full when desired, a knowledge of the numerous Latin titles of medicines and the many words used in the subscription is necessary. The following examples of abbreviations will be of service in understanding the several prescriptions here given:

Abbreviated Form	Unabbreviated Form	Translation
℞ P. Opii . . . . . gr. v.	Recipe. Pulveris Opii. grana quinque.	Take. Of Powder Opium.
Camph. . . . . gr. x.	Camphoræ, ... grana decem.	Of Camphor.
Sacch. Alb. . . . . gr. xv.	Sacchari Albi . . grana quindecim.	Of White Sugar.
M. ft. p. div. in p. æq. No. X; disp. in ch. cer.	Misce. fiat pulvis, divide in partes æquales numero decem. dispensentur in charta cerata.	Mix. Let a powder be made, divide into equal parts, 10 in number; let them be dispensed in wax paper.
℞ Cocain. Hydrochl. . . . 0.20 Gm.	Receipe. Cocainæ Hydrochloridi . .	Take. Of Hydrochloride of Cocaine, 2 decigrammes.
Ac. Borac . . . . . 0.32 Gm.	Acidi Boracici	Of Boracic Acid, 32 centigrammes.
Aq. Dest. . . . . 10.0 C.C.	Aquæ Destillatæ	Of Distilled Water, 10 cubic centimeters.
M. ft. collyr. filt.	Misce. fiat collyrium; filtra	Mix. Let an eyewash be made; filter.

With rare exceptions, the first three parts of a prescription are written in Latin, and the free use of abbreviations are understood by all pharmacists. The signature or directions for taking the medicine is, however, always written in English in this country. These directions should always be written legibly so that mistakes may be avoided by the dispenser and patient; verbal directions should never be given. In prescriptions the ingredients are written in the genitive (possessive) case, and the quantities, either by weight or measure, in the accusative (objective) case.

The following prescription will serve as an example:

℞ Potassii Citratis . . . . . ʒij (drachmas duas).
Spiriti Ætheris Nitrosi . . . . . ʒij (drachmas duas).
Aquæ Mentha Viridis, q. s. ad. ʒiv (quantum sufficiat ad uncias quatuor).
Ft. sol. (fiat solutio).

Potassii (of potassium) is the genitive singular of *potassium*, a neuter noun of the second declension; and is governed by *citratis*, because a noun limiting the signification of another noun governs the same in the genitive (possessive) case.

Citras (of citrate) is the genitive singular of *citras*, a feminine noun of the third declension, and is governed by *drachmas*, because a noun denoting quantity, quality, or property governs another noun, to which it is so related, in the genitive case.

Drachmas (drachms) is the accusative plural feminine of the numeral adjective *duo, duæ, duo*, and qualifies *drachmas*, with which it must agree in case, number and gender.

Ætheris (of ether) is the genitive singular of *æther*, a masculine noun of the third declension, and is governed by *spiriti* according to the rule given under *potassii*.

Nitrosi (of nitrous) is the genitive singular masculine of the adjective *nitrosus, nitrosa, nitrosum*, and qualifies *ætheris*, according to the rule given under *duas*.

Aquæ (of water) is the genitive singular of *aqua*, a feminine noun of the first declension, and is governed by *tantum*, understood, according to the rule given under citratis.

Menthæ (of mint) is the genitive singular of *mentha*, a feminine noun of the first declension, and is goverened by *aqua*, according to the rule under *potassii*.

Viridis (of green) is the genitive singular feminine of the adjective *viridis, veridis,* viride, and qualifies *menthæ,* according to the rule under *duas.*

Quantum (how much) may be parsed as an adverb of quantity qualifying the verb *sufficiat,* but it is better to parse it as a relative adjective with the adjective *tantum* (so much) as its redditive. In either case the adjective *tantum* is understood and governs *aquæ,* according to the rule that adjectives in the neuter gender, without a substantive, are regarded as nouns and govern the genitive case. *Tantum* is never used jointly with *quantum* in prescriptions, but the former is always understood, and the translation, even if both words are used or only the last, is "so much as."

Sufficiat (may be sufficient) is the third person singular, subjunctive mood, present tense, of the verb *sufficio, sufficere, suffaci, suffectum,* the third conjugation meaning to suffice or be sufficient, and is governed by *quantum* as its subject.

Ad (to) is a preposition governing the accusative *uncias.*

Uncias (ounces) is the accusative plural of *uncia,* a feminine noun of the first declension, and is governed by the preposition *ad.*

Quatuor (four) is an indeclinable numeral adjective and qualifies *uncias.*

Fiat (let there be made) is the third person singular, subjunctive mood, present tense, of the irregular verb *fio, fieri, factus* (to be made or done), and *solutio* is its subject.

Solutio (solution) is the nominative singular of *solutio,* a feminine noun of the third declension, and is the subject of *fiat.*

The date of the prescription, and a number, is also placed on it in case it should be repeated, its preservation being necessary. Any combination of medicines should be based upon well-defined objects in regard to form or usefulness, and although a formula need not contain more than one active agent, as an aid to prescription writing, the formula when consisting of four ingredients may indicate the first ingredient as the cure; the second ingredient as adjuvant for quick action; the third ingredient for safety, as the corrigent or corrective, and the fourth ingredient to render the other pleasant to the taste, as an excipient or vehicle.

When medicines are of a powerful or poisonous character, their indiscriminate repetition is very dangerous and should always be condemned, especially such prescriptions as contain morphine sulphate, cocaine hydrochlorate, or others of a similar character. Prescriptions of this nature should always have written upon them the words "Not to be repeated." Briefly described: On all prescriptions the patient's name and address and the date should first be written; then the sign ℞; then the title of each ingredient in Latin and in the genitive case, except that when a certain number only of an ingredient is ordered the name of the ingredient should be in the accusative case; then the number of doses the mixture is to contain in signs and Roman numerals; then the directions to the pharmacist or compounder, and the prescriber's name or initials.

A *formula* implies a prescribed method, and in pharmacy consists of the name and respective quantities of substances in a prescription and the manner of combining them. Two kinds of formulæ are recognized: First, the *official formula*, as contained in the U. S. Pharmacopœia. Second, the extemporaneous formula, such as is made up on the instant by the physician for his patient, and each ingredient named. In writing an official formula the name of the combination only is given. For example: Hoffman's anodyne (containing ether 32 1/2 per cent.; alcohol 65, ethereal oil 2 1/2. Dose ♏ v—℥j) is official under the title Spiritus Ætheris Compositus, and in prescribing it is only necessary to write the latter name with the quantity to be taken.

ELECTRICITY AS A THERAPEUTIC MEANS IN THE TREATMENT OF DISEASE.

Electricity is a powerful agent in many forms of nervous disease, especially in the treatment of paralysis and neuralgia.

Three forms of electricity are employed, viz.: The *induced current*, the *galvanic current*, both of which are dynamical, and the *static current*, which is frictional.

Galvanic electricity—galvanism, and induced electricity—faradism, are the two forms generally employed, frictional electricity being but seldom applied. What is known as electro-magnetism is a form of induced current, generated by the rotary instrument, and is not reliable. Faradism, so-called from its dis-

coverer, is generated by an instrument which is capable of applying slow or rapid shocks, and giving what is denominated a fine, strong, induced current. It consists of coils of wire; a small hammer of soft iron, attached to a spring; a pole containing a platinum-pointed screw, the hammer breaking the current in the coil of wire, and by rapid vibration producing shocks.

"The galvanic current is generated by a series of cells, sufficient in number to cause a current of tension, which is the resistance offered to the passage of a current.

"One cell supplies a current, the poles of other cells being alternately joined, and there are finally but two terminal poles." As the current from the first cell passes through the remaining cells, its power is increased and the effect is governed by the number of cells belonging to the circuit. There is also what is dominated a current of "quantity," which is generated by a large metallic surface in the battery cell, the tension current being generated by a number of small metal plates. The "tension current" serves the best purpose for medical use, while the "quantity current" furnishes heat, and is, therefore, adapted to purposes of electro-surgery. The modified Bunsen galvanic cell is the best for medical purposes, although what is known as the Siemens and Halske cell is extensively used; "it consists of an outer cell of glass, with elements of zinc and copper, a diaphragm of porous earthenware, and a diaphragm of papier mache, between the solutions." The Holtz electric instrument furnishes the best static current.

The Ruhmkorff coil is also employed, in the use of which but one wire is brought in contact with the patient, the other conductor being formed by the air, and a spark, similar to the ordinary spark from the friction machine, being produced.

When electricity is applied to the body, sponges of different sizes, or polished metallic surfaces, known as "electrodes," the metallic being the best, are employed, the effect upon the skin being similar to what is caused by puncturing with many small needles. The theory of *electro-therapeutics* is dependent upon the following effects:—

"If a portion of a motor nerve is included between the poles of a galvanic battery, it is said to be *polarized*, and in a state of electrotonus. At the positive pole, the irritability of the nerve

is diminished, while at the negative it is excited and more susceptible to stimulation. The condition at the positive pole is called *anelectrotonus*, and that at the negative *catelectrotonus*. The positive pole is known as the *anode;* the negative, the *cathode*, and these give the name to the states described. A nerve is said to be *tetanized* when the muscle supplied is thrown into a state of permanent tetanic contraction by a rapidly intermittent current. The passage of a number of these shocks for some time will diminish the irritability of the nerve to such an extent that, finally, there will be no further response. As an ascending current causes a greater irritability in a nerve than a descending one; a descending one depresses excitability. The stimulus is felt at the negative pole when the current commences, and when it is broken it is felt at the positive pole. A shock is felt at the *opening* of the weak currents; with moderately strong ones it is felt both at the opening and the closure. With very strong currents, it is impossible to tell the points of sensation, as the power of the nerve is impaired." The action upon involuntary muscles is less than upon the voluntary, and, as regards the latter, it is the same, or nearly, so as long as the integrity of their immediate nerve supply is concerned.

Degenerations and atrophies of muscles interfere to a considerable extent with their susceptibility to electric currents; hence, it is better, in diseased conditions, to pass the current through the nerve trunk which supplies them. The faradic current has but a local effect, the deeper muscles and nerves escaping.

When a metallic or sponge electrode is applied to the moistened skin, a pricking sensation follows, attended with redness and tingling, and this impression on the cutaneous nerves and muscles is known as *electro-muscular sensibility*. The galvanic current occasions a sensation of warmth, like that produced by a local stimulant, such as a mustard plaster, and when the faradic current is applied to the dry skin, or when the electrodes are but lightly applied, there is produced a sensation of pain, and the pain is the greater when caused by rapidly succeeding shocks than by slow ones.

The galvanic current causes deeper impressions than the faradic, and also electrolytic changes different from the faradic, producing absorption and changing the structure of the different

tissues, and beneficial results have resulted from its application in diseases of the brain. The physical effects of the galvanic current upon the sympathetic nerve are dilatation followed by contraction of the pupil, diminished frequency of the pulse, and a lowering of the tension of the carotid arteries. When electricity is used for the purpose of diagnosis, the existence of local tenderness, exalted sensibility, anæsthesia, paralysis, diseases of the brain, spinal cord, etc., may be ascertained. It has also been used to determine the question of doubtful death, whether certain affections are recent or of long standing, and to detect malingering. As various nervous diseases are associated with the loss of such functions of muscles as contraction and sensation, or the reverse, electricity determines the extent of such changes.

When employing the electric current, the anatomy of the part affected should be well understood; for example, for neuralgia of the fifth pair of nerves one pole should be applied as near as possible to the point of exit of the nerve from the cranium, and the other pole to the remote parts of distribution.

Galvanism and faradism are employed for the relief of pain and spasm to improve the nutritive processes, and to restore deficient muscular power, to stimulate sensation in nerves, to stimulate secretion, to influence circulation, to cause absorption of fluids, to bring about the absorption of morbid growths and deposits, to induce sleep, and in surgery, in the form of the galvanic cautery. The galvanic current is considered to be the most useful for the mediate, and the faradic current for the immediate application, the former proving serviceable in all forms of neuralgia, and especially in facial neuralgia, and the latter in headaches, especially those of a rheumatic nature.

Galvanism is also employed with advantage in sciatica, spinal irritation and hysteria, also tumors, such as aneurisms and goitre, these morbid products being dispersed by connecting the two poles of a galvanic battery with needles which are thrust into the morbid growth and generate a process known as *electrolysis*. In such operations bubbles of hydrogen gas are disengaged at the negative pole, which separate mechanically the adjacent tissues, breaking them up in such a manner that the disintegrated particles may be taken up by the circulation. Oxygen is disengaged at the positive pole, which forms an acid with

certain elements of the tissue, and the albumen is coagulated, forming a clot if this occurs in a cavity filled with blood.

For obtunding sensitive dentine and controlling peridental inflammation by electrolysis, Dr. F. McGraw suggests the following method: "To a 12 per cent. solution of cocaine add an equal amount of absolute alcohol. In connection with this use the galvanic current, varying the power as the needs of each case may indicate." The method of application is as follows: "After applying the rubber-dam, wet a pledget of cotton in the solution; place it in the cavity of the tooth; press the point of the positive pole on to the cotton, and the negative pole, with sponge attachment, to the cheek, turning on the current. An application of three minutes, with an interval of like duration, and then another three-minute application, is sufficient in the majority of cases, although it is occasionally necessary to make the third application. Then dry the cavity thoroughly and begin excavating." In case of peridental inflammation use a stronger current, which tetanizes the vessels and causes a diminished flow of blood to the parts and thus lessens congestion. The same current longer continued will cause electrolytic decomposition. "The medicinal agents he uses for peridental inflammation and for blind abscesses are a saturated solution of the chloride of sodium seven ounces, tincture of ergot, one ounce. The treatment of blind abscesses requires a stronger battery power in order to obtain the full effect of the electrolysis. Dr. Weeks has used this method successfully in the painless removal of pulps. (See Cataphoresis.)

Galvano-Cautery.—For surgical operations, as a substitute for the knife or écraseur, a platinum wire is placed between the poles of a powerful battery, the wire being adjusted in a handle, which in a few minutes becomes red hot, and is especially serviceable for operations in deep cavities where it would be impossible to use the knife, the application of such a galvanic cautery being unattended by pain or hemorrhage. The Galvano-Cautery consists of a platinum wire loop heated by passing a current of electricity through it, the heat being maintained as long as the current passes. Such an appliance will cut through the tissue to which it is applied without causing much hemorrhage. (See Escharotics.)

Electric portable mouth lamps are also employed for illuminat-

ing the mouth and examining the teeth, and carious cavities in them.

Strong currents of electricity should not be applied to the head, nor its use be persevered in for more than fifteen minutes at a time.

Electro-magnetism has been employed for relieving pain during the extraction of teeth, one pole of an ordinary battery being attached to the forceps and the other to a handle which is grasped by the patient. The susceptibility to the current is first ascertained by the patient holding both the forceps and the handle in his hands, and a feeble shock applied, which is gradually increased until the sensation is felt at or just beyond the elbows, when the current is somewhat reduced in power. After the gum has been lanced, the connection is made as before described, by the patient holding the handle and the operator the forceps in contact with the tooth to be removed, the handles of the instrument being isolated, when the operation is at once completed. Great diversity of opinion, however, exists as to the efficiency of this method, which has its advocates and opponents.

INCOMPATIBILITY.

Incompatibility gives rise to many dangers which may in a great measure be avoided by the use of the utmost simplicity in prescribing. 'The tendency of the present age is toward mono- rather than poly-pharmacy, and prescriptions with the orthodox *adjuvans* and *corrigens* are less frequently seen than formerly.' (Piffard.)

This subject can only be glanced at here. The following simple rules may help the burdened memory of the practitioner:

Never use more than one remedy at a time, if one will serve the purpose.

Never use strong mineral acids in combination with other agents, unless you know exactly what reaction will ensue. They decompose salts of the weaker acids and form ethers with alcohol.

Select the simplest solvent, diluent or excipient, you know of, remembering that the solvent power of alcohol and water, for their particular substances, decreases in proportion to the quantity of the other added.

Never combine *Free Acids* with hydrates or carbonates

Generally do not combine two or more soluble salts.

The following more or less insoluble salts will be formed whenever the materials of which they are composed are brought together in solutions; the Hydrates, Carbonates, Phosphates, Borates, Arseniates and Tannates of most earthy and heavy metals and alkaloids, and the metallic Sulphides; the Sulphates of Calcium, of Lead and of the subsalts of Mercury: the Chlorides, Iodides and Bromides of Bismuth, Silver, Lead and subsalts of Mercury; the Iodides of Quinine, Morphine and most alkaloids.

Alkalies precipitate the alkaloids and the soluble non-alkaline metallic salts, and (as also metallic Hydrates and Carbonates) neutralize free acids.

Alkaloids and their salts in solution are incompatible with tannic acid or with any preparation containing it, as they unite with this acid to form insoluble tannates. Alkaloids are also incompatible with metallic salts, especially double salts, as they cause precipitation.

Antipyrine is incompatible with solutions of carbolic acid and with spirits of nitrous ether.

Silver Nitrate, Lead Acetate, Corrosive Sublimate, Potassium Iodide should nearly always be prescribed alone. The first with Creasote forms an explosive compound. *Aconite* should never be given in any vehicle except water.

Silver Nitrate, and *Lead Acetate* and *Subacetate*, although incompatible with almost everything, may be combined with Opium: the latter forming with Opium a compound which, although insoluble, is therapeutically active as a lotion; also with most acids, with iodide of potassium and with the liquor iodi compositus. The solution of the subacetate of lead will precipitate solutions of acacia.

Corrosive Sublimate is incompatible with almost everything, and should be given in *Simple Syrup;* even the Compound Syrup of Sarsaparilla is said to decompose it.

Tannic Acid and substances containing it, are incompatible with albumin and gelatin. *Tannic Acid, Iodine* and the *soluble Iodides* are incompatible with the alkaloids and substances containing them, and with most soluble metallic salts. *Vegetable Infusions* are generally incompatible with metallic salts.

Glucosides, such as Santonin and Colocynthin, should not be prescribed with free acids or Emulsin.

Dangerous Compounds, because poisonous, are: Potassic Iodide with Potassic Chlorate; Hydrocyanic acid or Potassium Cyanide with metallic Hydrates, Carbonates, Sub-nitrates or Sub-chlorides, as Bismuth, Carbonate or Nitrate or Calomel.

Explosions would result from the combination of powerful oxidizers with readily oxidizable substances, as Potassium Chlorate or Permanganate with Tannin, Sugar, Sulphur, Sulphides, Vegetable powders, Glycerine, Alcohol, Tinctures or Ether.

Glycerine combined with nitric or sulphuric acids, chronic acid, permanganate of potassium, or chlorinated lime, will cause explosion.

Nitrate of Silver with albuminous substances causes coagulation; with chlorine, hydrochloric acid, and soluble chloride solutions, a precipitate of silver is formed; with metals it is reduced to metallic silver; with nitric acid and alcohol, fulminating (explosive) silver is formed.

Novocain is incompatible with caustic alkalies and carbonates, and the alkaloid reagents.

Cocaine Hydrochlorate is incompatible with alkalies and alkaline carbonates, tannic acid, potassium permanganate, metallic silver, silver nitrate, argyrol, mercurous chloride, and mercuric oxide.

Formalin.—Ammonia is incompatible with formalin.

Alum.—Alumen is incompatible with alkalies and their carbonates.

Prepared Chalk.—Creta Præparata when brought in contact with acids decomposes with effervescence owing to the liberation of carbon dioxide.

Orthoform is incompatible with argyrol, silver nitrate, potassium permanganate, and zinc chloride.

Incompatible Antiseptics.—Corrosive sublimate and iodine; corrosive sublimate and soap; iodine and soap; carbolic acid and iodine; carbolic acid and permanganate of potash; salicylic acid and soap; salicylic acid and permanganate of potash; permanganate of potash and oils, soap, or glycerine; aristol and caustic alkalies, ammonia, mercuric chloride, metallic oxides, starch, or any substance which possesses a powerful affinity for iodine.

TABLE OF THE DOSES OF MEDICINES.

GIVING THE DOSES OF OFFICIAL AND UNOFFICIAL DRUGS IN BOTH THE ENGLISH AND METRIC SYSTEMS, IN ACCORDANCE WITH THE NEW U. S. PHARMACOPŒIA.

Compiled specially for Gould's Pocket Dictionary, fourth edition, and the Physician's Visiting List by Wilbur L. Scoville, Ph.G., author of "The Art of Compounding"; member of the committee on revision of the Eighth (1900) Decennial Revision of the U. S. Pharmacopœia; formerly professor of theory and practice of pharmacy, Massachusetts College of Pharmacy, Boston.

The doses given are for adults; for children, either Young's or Cowling's rule is sufficiently accurate for most drugs, except narcotics and cathartics. According to Young's rule the dose is obtained by dividing the age by 12 plus the age. Thus, for a child of 3 years, $\frac{3}{3 + 12}$ = 3/15 or 1/5. Cowling's rule is to divide the number of the next birthday by 24. Thus, for a child 5 years old, 6/24 = 1/4. Of narcotics, like opium, not more than one-half of this proportion should be prescribed, while of cathartics this dose may be exceeded two or three times.

For subcutaneous administration the dose should be about one-half of that given by the mouth; and for rectal adminstration about twice the amount given by the mouth. Equivalents: one teaspoonful, ℥i or 4 C.C.; one dessertspoonful, ℥ij or 8 C.C.; one tablespoonful, ℥iv or 15 C.C.

Remedies	Dose. Apoth.	Dose. Metric
Absinthin	gr. 15–30	1.000–2.000
Acetal	℥ 1 1/2–3	6.000–12.000
Acetanilid	gr. 4	0.250
Acetanilid pulv. comp.	gr. 7 1/2	0.500
Acetphenetedin	gr. 7 1/2	0.500
Acid. acet. dil.	♏ 30	2.000
arsenous	gr. 1/30	0.002
benzoic	gr. 7 1/2	0.500

Remedies	Dose. Apoth.	Dose. Metric
Acid. boric	gr. 7 1/2	0.500
cacodylic	gr. 1/6–1/2	0.010–0.030
camphoric	gr. 15	1.000
carbolic	gr. 1	0.065
carbol-glycerit	♏ 5	0.300
cathartic	gr. 4–5	0.250–0.333
chrysophanic	gr. 1/8–10	0.008–0.666
citric	gr. 7 1/2	0.500
fluoric. dil.	♏ 15–20	1.000–1.333
gallic	gr. 15	1.000
hydriodic dil.	♏ 8	0.500
syrup	ʒ 1	4.000
hydrobrom. dil.	ʒ 1	4.000
hydrochloric	♏ 3	0.200
hydrochlor. dil.	♏ 15	1.000
hydrocyan. dil.	♏ 1 1/2	0.100
hypophosphorous (30%)	♏ 3	0.200
hypophosphorous dil.	♏ 8	0.500
lactic	♏ 30	2.000
nitric	♏ 3	0.200
nitric dil.	♏ 30	2.000
nitro-hydrochloric	♏ 3	0.200
nitro-hydrochloric dil.	♏ 15	1.000
oxalic	gr. 1/8–1/4	0.008–0.016
phosphoric	♏ 3	0.200
phosphoric dil.	♏ 30	2.000
picric	gr. 1–5	0.066–0.333
salicylic	gr 7 1/2	0.500
sulphuric arom.	♏ 15	1.000
sulphuric dil.	♏ 30	2.000
sulphurous	♏ 30	2.000
tannic	gr. 7 1/2	0.500
tannic, glycerite	♏ 30	2.000
tartaric	gr. 7 1/2	0.500
Aconitum	gr. 1	0.065
Aconiti, extr.	gr. 1/6	0.010
extr. fld.	♏ 1	0.050
tinct. (10%)	♏ 2	0.100
tinct. Fleming's	♏ 1	0.050
Aconitine	gr. 1/400	0.00015
Adonidin	gr. 1/10–1/4	0.006–0.016
Agaricin	gr 1/4–1/2	0.016–0.033
Agathin	gr. 5–10	0.333–0.666
Agurin	gr. 10–30	0.600–2.000
Ailanth., ext. fld.	♏ 10–60	0.666–4.000
tinct.	♏ 10–32	0.666–8.000
Airol	gr. 5–15	0.300–1.000
Alantol	gr. 1/6	0.010
Allii, syrup	ʒ 1–4	4.000–16.000
Aloe, purif.	gr. 4	0.250
ext. aquos.	gr. 2	0.125
pilulæ	No. 2	

Remedies	Dose. Apoth.	Dose. Metric
Aloe, pilulæ, et asaf.	No. 2–5	
pilulæ, et ferri	No. 2	
pilulæ, et mast.	No 2	
pilulæ, et myrrh.	No. 2	
pulvis, et Canellæ	gr. 5–20	0.333–1.333
tinct.	♏ 30	2.000
tinct., et myrrh	♏ 30	2.000
vinum	℥ 1–2	4.000–8.000
Aloin	gr. 1	0.065
bell. and strych. pil.	Pil. No. 2	
Alumen	gr. 7 1/2	0.500
Ammoniæ aqua	♏ 15	1.000
spiritus	♏ 15	1.000
spiritus arom.	♏ 30	2.000
spiritus fœtid.	℥ 1/2–1	2.000–4.000
Ammonii acetat., liquor	℥ 4	16.000
benzoas	gr. 15	1.000
bromid	gr. 15	1.000
carbonat	gr. 4	0.250
chlorid.	gr. 7 1/2	0.500
iodid.	gr. 4	0.250
salicylate	gr. 4	0.250
picrat	gr. 1/8–1/2	0.008–0.033
valerate	gr. 7 1/2	0.500
Amygdalæ amar. aqua.	℥ 1	4.000
emuls.	℥ 4	120.000
amar., oleum	♏ 1/2	0.030
Amyl nitris	♏ 3	0.200
Amylene hyd.,	℥ 1–1 1/2	4.000–6.000
Amylum iodatum	gr. 3–30	0.200–2.000
Analgen	gr. 2–5	0.133–0.333
Anarcotin	gr. 1–3	0.066–0.200
Anemonin	gr. 1/2–1 1/2	0.040–0.100
Anisi, oleum	♏ 3	0.200
spiritus	♏ 60	4.000
Anthemis	gr. 30	2.000
Antifebrin	gr. 5	0.300
Antimonii oxid.	gr. 2	0.100
pil. comp.	No. 1–3	
pulv.	gr. 5	0.300
sulphid, pur.	gr. 2	0.100
sulphuret	gr. 2	0.100
et potas. tart.; expector.	gr. 1/10	0.005
emet.	gr. 1/2	0.030
vin.	♏ 15	1.000
Antipyrin	gr. 4	0.250
Antiseptic sol.	℥ 1	4.000
Antispasmin	gr. 1/6–1/4	0.010–0.016
Antitoxin (diphtheria)	3000 units	
Apiol	♏ 3–5	0.200–0.333
Apiolin	gr. 1 1/2–3	0.100–0.200
Apocodein hydrochl.	gr. 1–1 1/4	0.060–0.080

Remedies	Dose. Apoth.	Dose. Metric
Apocynum	gr. 15	1.000
Apocyn. cannab. ex. fl.	♏ 15	1.000
Apolysin	gr. 5.20	0.333–1.333
Apomorph. hydrochl.; exp.	gr. 1/30	0.002
emet.	gr. 1/10	0.005
Arubtin	gr. 3–5	0.200–0.300
Arecolin	gr. 1/20–1/16	0.003–0.004
Argentamin	0.1% solut. for inject.	
Argenti iodid.	gr. 1/4–1	0.016–0.066
nitras.	gr. 1/5	0.010
oxid	gr. 1	0.065
Argonin.	0.2–1% solut. for inject.	
Aristol	gr. 2	0.100
Arnicæ flor.	gr. 15	1.000
flo., tinct.	♏ 15	1.000
Aromatic, fld. ext.	♏ 15	1.000
powd.	gr. 15	1.000
Arseni, trioxid	gr. 1/30	0.002
acid., liquor	♏ 3	0.200
Arseni, liquor, brom.	♏ 1–4	0.066–0.266
bromid.	gr. 1/64–1/15	0.001–0.004
iodid.	gr. 1/10	0.005
et hydrarg. iod., liq.	♏ 1 1/2	0.100
Asafetida	gr. 4	0.250
emuls.	ʒ 4	16.000
pilulæ	No. 2	
tinct.	♏ 15	1.000
Asaprol	gr. 3–6	0.200–0.400
Asparagus, fl. ex.	ʒ 1/2–1	2.000–4.000
Aspidium	ʒ 1	4.000
Aspid., ext. fl.	ʒ 1	4.000
oleores	gr. 30	2.000
Atropin sulph.	gr. 1/160	0.0004
Aurantii amar. ext. fl.	♏ 15	1.000
amar., tinct.	ʒ 1	4.000
dulcis, tinct.	ʒ 1	4.000
Auri et sod. chlorid	gr. 1/10	0.005
Bals. Peruv.	gr. 15	1.000
tolutau	gr. 15	1.000
syr.	ʒ 4	16.000
tinct.	ʒ 1	4.000
Baptis., ext.	gr. 1–10	0.066–0.666
ext. fld.	♏ 2–20	0.133–1.333
tinct.	♏ 5–30	0.333–2.000
Basham's mixture	ʒ 4	16.000
Barii chlor.	gr. 1/10–1/2	0.0065–0.032
Beeberin	gr. 1/12–1 1/2	0.005–0.100
Belladon., fol.	gr. 1	0.065
rad.	gr. 3/4	0.045
ext., alc.	gr. 1/5	0.010

Remedies	Dose. Apoth.	Dose. Metric
Belladon., rad., ext. fld.	♏ 1	0.050
tinct.	♏ 8	0.500
Benzaldehyde	♏ 1/2	0.030
Benzanilid	gr. 10–15	0.0650–1.000
Benzoin, tinct.	♏ 15	1.000
tinct. comp.	♏ 30	2.000
Benzol,	♏ 8	0.500
Benzo-naphthol	gr. 5–8	0.333–0.520
Benzosulphinide	gr. 3	0.200
Berber, ext. fld.	♏ 30	2.000
tinct.	♏ 10–60	0.666–4.000
Berberin	gr. 1–10	0.066–0.666
Betanaphthol	gr. 4	0.250
bismuth	gr. 10–15	0.666–1.000
Betol	gr. 4–8	0.260–0.520
Betulæ ol.	♏ 15	1.000
Bismuth et ammon. cit.	gr. 2	0.125
salicylat.	gr. 7 1/2	0.500
subcarb.	gr. 7 1/2	0.500
sub. nitr.	gr. 7 1/2	0.500
subgallat.	gr. 4	0.250
Bismutose	gr. 15–60	1.000–4.000
Bold., tinct.	♏ 5–8	0.333–0.533
Brayera	ʒ 2–8	8.000–32.000
ext. fl.	ʒ 2–8	8.000–32.000
infus.	ʒ 2–8	64.000–256.000
Bromalin	gr. 30–60	2.000–4.000
Bromipin	ʒ 1–4	4.000–15.000
Bromoform	♏ 3	0.200
Bromol	gr. 1–2	0.166–0.133
Bryon., tinct.	♏ 5–30	0.333–2.000
Brucina (see Nux Vom.)		
Buchu. ext. fl.	♏ 30	2.00
infus.	ʒ 1/2–2	16.000–64.000
Butyl chloral hydrate	gr. 5–20	0.333–1.333
Cactii grandiflor., ex. fl.	♏ 8	0.500
Cadi ol.	♏ 3	0.200
Caffein	gr. 1	0.065
citrat.	gr. 2	0.125
citrat. efferv.	ʒ 1	4.000
Cajuput, oleum	♏ 8	0.500
Calam., ext. fl.	♏ 15	1.000
Calcis, liquor	ʒ 4	16.000
Calc. bromid.	gr. 15	1.000
carb. precip.	gr. 15	1.000
chlorid.	gr. 7 1/2	0.500
glycerophosphat.	gr. 5	0.300
hypophosph.	gr. 7 1/2	0.500
iodid	gr. 1–3	0.066–0.200
lactophosph.	gr. 3–10	0.200–0.666
syr.	ʒ 2	8.000
phosph. precip.	gr. 15	1.000

Remedies	Dose. Apoth.	Dose. Metric
Calx chlorata	gr. 4	0.250
sulphurata	gr. 1	0.065
Calendula	gr. 15	1.000
Calx, liq.	ʒ 4	15.000
syr.	♏ 30	2.000
syr. lac. phos.	ʒ 2	8.000
Calumba	gr. 30	2.000
fluid ext.	♏ 30	2.000
tinct.	ʒ 1	4.000
Camphora	gr. 2	0.125
aqua	ʒ 2	8.000
spirit	♏ 15	1.000
monob.	gr. 2	0.125
Cannabis ind.	gr. 1	0.065
ext.	gr. 1/5	0.010
fluid	♏ 1	0.050
tinct.	♏ 10	0.600
Cantharis	gr. 1/2	0.030
Canthar. tinct.	♏ 5	0.300
Capsicum	gr. 1	0.065
ext. fl.	♏ 1	0.050
oleores.	♏ 1/2	0.030
tinct.	♏ 8	0.500
Carbo ligni	gr. 15	1.000
Cardamom	gr. 15	1.000
Cardam. tinct.	ʒ 1	4.000
tinct., comp.	ʒ 1	4.000
Cari, oleum	♏ 3	0.200
Caryophyllus	gr. 4	0.250
Caryophyl. ol.	♏ 3	0.200
Cascara sag.	gr. 15	1.000
ext. fl.	♏ 15	1.000
aromat. fld. ext.	♏ 15	1.000
Cascarill, ex. fl.	ʒ 1–2	4.000–8.000
Cascarin	gr. 2–3	0.133–0.200
Cassia fistul.	ʒ 1	4.000
Castan, ext. fl.	ʒ 1/2–2	2.000–8.000
Catechu	gr. 15	1.000
tinct. comp.	ʒ 1	4.000
Cathartic, comp. pil.	Pil. No. 2	
veget. pil.	Pil No. 2	
Cerii oxal.	gr. 1	0.065
Chenopod. ol.	♏ 3	0.200
Chimaph. ex. fl.	♏ 30	2.000
Chinoidin (see Cinchona)		
Chinolin tartras	gr. 5–20	0.333–1.333
Chinosol	20% sol. as antisept.	
Chirat., ext. fl.	♏ 15	1.000
tinct.	♏ 15–60	1.000–4.000
Chloral, hydrat.	gr. 15	1.000
Chloralamid	gr. 15	1.000

Remedies	Dose. Apoth.	Dose. Metric
Chloralose	gr. 3–10	0.200–0.600
Chloramid	gr. 20–30	1.033–2.000
Chloretone	gr. 5–20	0.300–1.300
Chlorobrom.	ʒ 1	32.000
Chloroform	♏ 5	0.300
aqua	ʒ 4	16.000
emuls.	ʒ 2	8.000
spirit	♏ 30	2.000
et morph. tinct.	♏ 5–10	0.333–0.666
Chlorodyne	♏ 10–30	0.666–2.000
Chlori, aqua	ʒ 1	4.000
Chrysarobin	gr. 1/2	0.030
Cimicifugæ, ext. fl.	♏ 15	1.000
tinct.	ʒ 1	4.000
Conchona	gr. 15	1.000
ext.	gr. 1–5	0.666–0.333
ext. fl.	♏ 30	2.000
tinct.	ʒ 1	4.000
tinct. comp.	ʒ 1	4.000
Cinchonidin, sulph.	gr. 4	0.250
Cinchonin	gr. 1–30	0.066–2.000
salicylat.	gr. 1–30	0.066–2.000
sulph.	gr. 4	0.250
Chinoidin	gr. 1–30	0.066–2.000
Cinnaldehyde	♏ 1	0.050
Cinnamomum	gr. 4	0.250
aqua	ʒ 4	16.000
oleum	♏ 1	0.050
spirit	♏ 30	2.000
tinct.	♏ 30	2.000
Citrophen	gr. 8–15	0.500–1.000
Coca	gr. 30	2.000
fld. ext.	♏ 30	2.000
wine	ʒ 4	16.000
Cocaine, mur.	gr. 1/2	0.030
Codeine	gr. 1/2	0.030
Codein, phos.	gr. 1/2	0.030
sulph.	gr. 1/2	0.030
Cocculus, ex. fl.	♏ 1–3	0.066–0.200
tinct.	♏ 2–15	0.133–1.000
Cola	gr. 15	1.000
fld. ext.	♏ 15	1.000
Colchici rad.	gr. 4	0.250
Colchici semen	gr. 3	0.200
ext.	gr. 1	0.065
rad. ext. fl.	♏ 4	0.250
sem. ext. fl.	♏ 3	0.200
tinct.	♏ 30	2.000
sem., vin.	♏ 30	2.000
Colchicine	gr. 1/28	0.0005
Collargol	gr. 1/8–1/3	0.008–0.020
Colocynth, ext.	gr. 1/2	0.020
ext. comp.	gr. 7 1/2	0.500

Remedies	Dose. Apoth.	Dose. Metric
Pill cath. co.	No. 2	
Condurango, ext. fl.	ʒ 1–2	4.000–8.000
Conii, ext. fl.	♏ 3	0.200
tinct.	♏ 5–30	0.333–2.000
Coniine	gr. 1/64–1/32	0.001–0.002
Convallar.	gr. 7 1/2	0.500
ext. fl.	♏ 8	0.500
infus.	ʒ 1/2–2	16.000–64.000
Convallaramin	gr. 3/4–1	0.050–0.066
Convolvulin	gr. 1–2	0.060–0.130
Copaiba	♏ 15	1.000
massa	gr. 30	2.000
oleum	♏ 8	0.500
Coriand. ol.	♏ 3	0.200
Cornus, ext. fl.	♏ 10–60	0.666–4.000
Cornutin	gr. 1/12–1/6	0.005–0.011
Cotarnin hydrochlor.	gr. 3/4–3	0.018–0.200
Coto, tinct.	♏ 1–15	0.066–1.000
Cotoin	gr. 1–4	0.066–0.266
Creosot. carb.	♏ 5	0.300
Creosotum	♏ 3	0.200
aqua	ʒ 2	8.000
Cresol	♏ 1	0.050
Creta præp.	gr. 15	1.000
mist.	ʒ 4	16.000
pulv. co.	gr. 30	2.000
Croci, tinct.	ʒ 1–2	4.000–8.000
Croton chloral	gr. 5–10	0.333–0.666
Cubeba	gr. 15	1.000
ext. fl.	♏ 15	1.000
oleores.	gr. 7 1/2	0.500
oleum	♏ 8	0.500
tinct.	ʒ 1–2	4.000–8.000
trochis.	No. 1–3	
Cup. acetas	gr. 1/10–1/4	0.006–0.016
ammon.	gr. 1/6–1	0.011–0.066
arsenit.	gr. 1/100	0.00067
sulphas. astr.	gr. 1/5	0.010
emet.	gr. 4	0.250
Curare	gr. 1/32–1/6	0.002–0.011
Curarin	gr. 1/100–1/40	0.00067–0.0015
Cusso	ʒ 4	16.000
Cypriped. ex. fl.	♏ 15	1.000
Damianæ, ext.	gr. 2–10	0.133–0.666
ext. fl.	♏ 10–60	0.666–4.000
Daturin	gr. 1/120–1/20	0.0005–0.003
Dermatol	gr. 8	0.500
Digitalis	gr. 1	0.065
ext.	gr. 1/5	0.010
ext. fl.	♏ 1	0.050
infus.	ʒ 2	8.000
tinct.	♏ 15	1.000

Remedies	Dose. Apoth.	Dose. Metric
Digitalin ("German" Merck)	gr. 1/64–1/32	0.001–0.002
("French" Merck),	gr. 1/250–1/100	0.00026–0.00067
(Nativelle)	gr. 1/100–1/64	0.00065–0.001
Digitoxin	gr. 1/200–1/100	0.00033–0.00065
Dionin	gr. 1/4–1	0.016–0.066
Dioscor. ex. fl.	♏ 15–30	1.000–2.000
Diuretin	gr. 10–20	0.666–1.333
Donovan's sol.	♏ 1 1/2	0.100
Dormiol	gr. 8–30	0.500–2.000
Dover's powd. (see Ipecac)		
Dracont. ex. fl.	♏ 30–60	2.000–4.000
Dubois., ext.	gr. 1/6–1/4	0.011–0.016
tinct.	♏ 5–20	0.333–1.333
Duboisin sulph.	gr. 1/100–1/60	0.00067–0.001
Dulcamar. ex. fl.	ʒ 1–2	4.000–8.000
Elaterin	gr. 1/10	0.005
trit.	gr. 1/2	0.030
Elix. I. Q. and S. phos.	ʒ 1	4.000
Emetin	gr. 1/60–1/8	0.001–0.008
Eosote	gr. 3–5	0.200–0.333
Ergota	gr. 30	2.000
ext.	gr. 4	0.250
ext. fl.	♏ 30	2.000
vin.	ʒ 2	8.000
Ergotin	gr. 2–8	0.133–0.533
Erigeron ol.	♏ 15	1.000
Eriodictyon	gr. 15	1.000
ext. fl.	♏ 15	1.000
Erythrol tetranitrate	gr. 1/2–1	0.033–0.066
Erythrox, fld. ext.	♏ 30	2.000
vin.	ʒ 2	8.000
Eserin	gr. 1/120	0.0005
Ether	♏ 15	1.000
spirit	ʒ 1	4.000
spirit. comp.	ʒ 1	4.000
spirit. nit.	♏ 30	2.000
Ether, acetic	♏ 15	1.000
Ethyl bromid.	♏ 10–60	0.666–4.000
Ethyl carbamate	gr. 15	1.000
Eucaine β	2% solut. as anæs.	
Eucalyptol	♏ 5	0.300
Eucalyptus, ext. fl.	♏ 30	2.000
oleum	♏ 8	0.500
tinct.	ʒ 1/2–2	2.000–8.000
Euchinin	gr. 15–30	1.000–2.000
Eudoxin	gr. 5–15	0.300–1.000
Eugenol	♏ 3	0.200
Euonymin	gr. 1/2–3	0.033–0.200
Euonymus	gr. 7 1/2	0.500
ext.	gr. 2	0.125
fluid ext.	♏ 8	0.500
Eupator, ex. fl.	♏ 30	2.000

Remedies	Dose. Apoth.	Dose. Metric
Euphorin	gr. 5–15	0.300–1.000
Euquinine	gr. 3–10	0.200–0.600
Exalgin	gr. 2–8	0.100–0.500
Fel. bov. inspis.	gr. 7 1/2	0.500
bovis purif.	gr. 7 1/2	0.500
Ferratin	gr. 15–30	1.000–2.000
Ferropyrin	gr. 5–15	0.333–1.000
Ferrosomatose	gr. 30–60	2.000–4.000
Ferri dialys.	♏ 5–15	0.333–1.000
reduct.	gr. 1	0.065
Fer. acetat., tinct.	♏ 10–60	0.666–4.000
albuminas	gr. 10–20	0.666–1.333
album. liq	ʒ 1–2	4.000–8.000
amar. vin.	ʒ 1	4.000
arsen.	gr. 1/10–1/6	0.006–0.011
benzoas	gr. 1–5	0.066–0.333
bromid. syr.	♏ 5–30	0.333–2.000
carb. sacch.	gr. 4	0.250
carb., mass.	gr. 4	0.250
chlorid.	gr. 1	0.065
chlorid., liq	♏ 1 1/2	0.100
ch orid. tinc.	♏ 8	0.500
citrat.	gr. 4	0.250
citrat., liq.	♏ 8	0.500
citrat., vin.	ʒ 1	4.000
comp., mist.	ʒ 4	16.000
comp., pil.	No. 2	
glycerophosphat.	gr. 1–3	0.066–0.200
hypophos.	gr. 3	0.200
iodid., pil.	No. 2	
iodid., sac.	gr. 5–10	0.333–0.666
iodid., syr	♏ 15	1.000
lactas.	gr. 2–5	0.100–0.300
phosphas	gr. 4	0.250
pyrophosph.	gr. 4	0.250
subsulph., liq	♏ 3	0.200
sulph. exsic.	gr. 2	0.125
sulph. gran.	gr. 3	0.200
valer.	gr. 1–3	0.066–0.200
vinum	ʒ 2	8.000
et ammon acet. liq.	ʒ 4	16.000
et am. cit.	gr. 4	0.250
et am. sulph.	gr. 7 1/2	0.500
et am. tar.	gr. 4	0.250
et potas. tart.	gr. 4	0.250
et quin. cit.	gr. 4	0.250
quin. strych. phos. syr.	ʒ 1	4.000
quin. strych. phos. glycerit.	♏ 15	1.000
et strych. cit.	gr. 2	0.125
Fœniculi, ol.	♏ 3	0.200
Fowler's sol.	♏ 3	0.200
Frangulæ, ex. fl.	♏ 15	1.000

Remedies	Dose. Apoth.	Dose. Metric
Galban., pil. co.	No. 1–3	
Galla	gr. 7 1/2	0.500
Gallæ, tinct.	ʒ 1	4.000
Gambir	gr. 15	1.000
tinct.	ʒ 1	4.000
Gamboge	gr. 2	0.125
Gaultheria, ol.	♏ 15	1.000
Gelsem., ex. fl.	♏ 1	0.050
tinct.	♏ 8	0.500
Gelsemin	gr. 1/60–1/20	0.001–0.003
(alkaloid)	gr. 1/125–1/30	0.0005–0.002
Gentian, ext.	gr. 4	0.250
ext. fl.	♏ 15	1.000
infus. comp.	ʒ 1–4	4.000–16.000
tinct. comp.	ʒ 1	4.000
Geosote	gr. 5–20	0.333–1.333
Geranii, ex. fl.	♏ 15	1.000
Glandula, suprarenalis	gr. 4	0.250
thyroidea	gr. 4	0.250
Glonoin, spirit	♏ 1	0.050
Glycerinum	♏ 60	4.000
Glycerylnitrat. spir.	♏ 1	0.050
Glycyrrhiz., ext.	gr. 15	1.000
fld. ext.	♏ 30	2.000
mist. comp.	ʒ 2	8.000
pulv. comp.	gr. 60	4.000
Gold and sod. chlor.	gr. 1/10	0.005
Gossyp., ex. fl.	♏ 30	2.000
Granat., ex. fl.	♏ 30	2.000
Griffith's mixt.	ʒ 4	16.000
Grindel. ext. fl.	♏ 30	2.000
Guaiacol	♏ 8	0.500
carb.	gr. 15	1.000
Guaiac, res.	gr. 15	1.000
Guaiaci, tinct.	ʒ 1	4.000
tinct. am.	♏ 30	2.000
Guarana	gr. 30	2.000
Guaranæ, ex. fl.	♏ 30	2.000
Hamamel. ex. fl.	♏ 30	2.000
aqua	ʒ 2	8.000
Hedonal	gr. 15–30	1.000–2.000
Hedeoma	ʒ 2	8.000
ol.	♏ 3	0.200
Hellebor. nig., ext.	gr. 1/2–5	0.033–0.333
nig. ext. fl.	♏ 5–15	0.333–1.000
Hematox. ext.	gr. 15	1.000
Hemogallol	gr. 5–20	0.333–1.333
Hemol	gr. 5–10	0.333–0.666
Heroin, mur.	gr. 1/20	0.003
Hetol	gr. 1/12–1/8	0.005–0.008
Hexamethyleneamine	gr. 4	0.250
Holocaine	1% sol't for anæsth	

Remedies	Dose. Apoth.	Dose. Metric
Homatropin hydrobrom.	gr. 1/128	0.0005
Humulus	gr. 30	2.000
tinct.	ʒ 1–2 1/2	4.000–10.000
Hydrang. ex. fl.	♏ 30–60	2.000–4.000
Hydrarg. chlo. cor.	gr. 1/20	0.003
chlo. mit. laxatixe	gr. 2	0.125
alterative	gr. 1	0.065
c. creta	gr. 4	0.250
iodid. flav.	gr. 1/5	0.010
iodid. rub.	gr. 1/20	0.003
massa	gr. 4	0.250
subsulph. flv.	gr. 1/4–1/2	0.016–0.033
Hydrast. ex. fl.	♏ 30	2.000
tinct.	ʒ 1	4.000
glycerit	ʒ 1	4.000
Hydrastin	gr. 5–10	0.333–0.666
(alkaloid)	gr. 1/5	0.010
Hydrastinine, hydrochlor.	gr. 1/2	0.030
Hydrogen, diox. aqua	ʒ 1	4.000
Hyoscyam. ext.	gr. 1	0.065
ext. fl.	♏ 3	0.200
tinct.	♏ 15	1.000
Hyoscin., hydrobr.	♏ 1/128	0.0005
Hyoscyamin. sulph. or hydrobr.	♏ 1/128	0.0005
Hypnal	♏ 1/2–1	0.033–0.066
Hypnon	♏ 5–10	0.333–0.666
Hypophos, syr.	ʒ 2	8.000
comp. syr.	ʒ 2	8.000
Ichthalbin	gr. 5–10	0.333–0.666
Ichthyol	gr. 4	0.250
Ignatiæ, ext.	gr. 1/4–1/2	0.016–0.033
ext. fl.	♏ 1–6	0.066–0.400
tinct.	♏ 2–10	0.133–0.666
Ingluvin	gr. 10–20	0.666–1.333
Iodine	gr. 1/10	0.005
Iodipin, 10%	ʒ 1–2	4.000–8.000
Iodi, liq. com.	♏ 3	0.200
tinct.	♏ 1 1/2	0.100
Iodoformum	gr. 4	0.250
Iodol	gr. 4	0.250
Ipecac. (exp.)	gr. 1	0.065
(emet.)	gr. 15	1.000
ex. fl. (emet.)	♏ 15	1.000
pulv. et opii	gr. 8	0.500
syr. exp.	♏ 15	1.000
emet.	ʒ 4	15.000
tinct., et. opii	♏ 8	0.500
vin.	♏ 15	1.000
Iris, ext.	gr. 1–5	0.066–4.000
ext. fl.	♏ 5–30	0.333–2.000
Iridin	gr. 1–3	0.066–0.200
Jalapa	gr. 15	1.000

Remedies	Dose. Apoth.	Dose. Metric
Jalapa, pulv. comp.	gr. 30	2.000
res.	gr. 2	0.100
Jambul	gr. 5–15	0.333–1.000
ex. fl.	♏ 5–20	0.333–1.333
Juglans., ext.	gr. 5–20	0.333–1.333
Junip., ext. fl.	♏ 30–60	2.000–4.000
oleum	♏ 3	0.200
spirit	♏ 30	2.000
spirit. comp.	ʒ 2	8.000
Kairin	gr. 3–30	0.200–2.000
Kamala	ʒ 1–2	4.000–8.000
ext. fl.	♏ 30–60	2.000–4.000
Kino	gr. 7 1/2	0.500
tinct.	ʒ 1	4.000
Kolæ, ex. fl.	♏ 15	1.000
Krameriæ, ext.	gr. 7 1/2	0.500
ext. fl.	♏ 15	1.000
syr.	ʒ 1	4.000
tinct.	ʒ 1	4.000
Kryofin	gr. 5–15	0.300–1.000
Lactopeptin	gr. 5–15	0.333–1.000
Lactophenin	gr. 5–15	0.333–1.000
Lactucarium	gr. 15	1.000
tinct.	♏ 30	2.000
syr.	ʒ 2	8.000
Lappa, fld. ext.	♏ 30	2.000
Largin	gr. 5–8	0.300–0.500
Lauroceras. aq.	♏ 5–30	0.333–2.000
Lavandulæ, ol.	♏ 3	0.200
spirit	♏ 30	2.000
tinct., comp.	♏ 30	2.000
Leptandræ, ex.	gr. 4	0.250
ext. fl.	♏ 15	1.000
Limon. oleum	♏ 3	0.200
succus	℥ 1	30.000
Lini, oleum	℥ 1	30.000
Lith benzoas	gr. 15	1.000
bromid.	gr. 15	1.000
carb.	gr. 7 1/2	0.500
citras	gr. 7 1/2	0.500
citras, efferv.	ʒ 2	8.000
salicylas	gr. 15	1.000
Lobeliæ, fl. ext.	♏ 8	0.500
tinct., exp.	♏ 15	1.000
emet.	ʒ 1	4.000
Lugol's sol.	♏ 3	0.200
Lupulin,	gr. 7 1/2	0.500
fld. ext.	♏ 8	0.500
oleores.	♏ 3	0.200
Lycetol	gr. 5–15	0.300–1.000
Lysidin	gr. 1–5	0.066–0.333
Magnesia	gr. 30	2.000

Remedies	Dose. Apoth.	Dose. Metric
Magnes., carb.	gr. 45	3.000
citras gran.	ʒ 2–8	8.000–32.000
liq.	℥ 12	360.000
glycerophos.	gr. 2–5	0.133–0.333
milk	ʒ 1–2	4.000–8.000
mist. et asaf.	ʒ 1/2–4	2.000–16.000
oxid.	gr. 30	2.000
sulphas	ʒ 4	16.000
sulph. efferv.	ʒ 4	16.000
Malakin	gr. 5–10	0.333–0.666
Malarin	gr. 5–15	0.333–1.000
Male fern, oleores.	gr. 30	2.000
Malti, ext.	ʒ 4	16.000
Mangan. diox.	gr. 4	0.250
hypophos.	gr. 3	0.200
iodid. syr.	♏ 10–30	0.666–2.000
sulph.	gr. 4	0.250
Manna	ʒ 4	16.000
Marrub., ex. fl.	♏ 30	2.000
Mastic	gr. 30	2.000
Matico, ext. fl.	♏ 60	4.000
Matricar. ex. fl.	ʒ 4	16.000
Mel.	ʒ 1	4.000
rosæ	ʒ 1	4.000
Menth. pip., ol.	♏ 3	0.200
pip., spirit	♏ 30	2.000
vir., ol.	♏ 3	0.200
spir.	♏ 30	2.000
Menthol	gr. 1	0.065
Methylacetanilid	gr. 4	0.250
Methylal	♏ 2–5	0.133–0.333
Methylene blue	gr. 4	0.250
Methyl. salicyl.	♏ 15	1.000
Methylthionine hydrochlor	gr. 4	0.250
Mezereum, fld. ext.	♏ 8	0.500
Migrainin	gr. 2–5	0.133–0.333
Morphine, acet. mur. et sulph.)	gr. 1/4	0.015
comp. pulv	gr. 7 1/2	0.500
Morrhuæ, oleum	ʒ 4	16.000
Moschus	gr. 4	0.250
tinct.	ʒ 1	4.000
Muscarin	gr. 1/30–1	0.002–0.066
Mustard, vol. oil	♏ 1/8	0.008
Myristica	gr. 7 1/2	0.500
ol.	♏ 3	0.200
Myrrh. tinct.	♏ 15	1.000
Napellin	gr. 1/2–3/4	0.033–0.018
Naphthalin	gr. 2	0.125
Neurodin	gr. 1/2–3	0.033–0.200
Nicotine	♏ 1/20–1/10	0.003–0.006
Nitroglycerin	♏ 1/200–1/50	0.0003–0.001
tabellæ (āā gr. 1/100)	No. 1–2	
spir.	♏ 1	0.050

Remedies	Dose. Apoth.	Dose. Metric
Nosophen	gr. 5–8	0.333–0.533
Nuclein	gr. 20–60	1.333–4.000
Nux vom.	gr. 1	0.065
ext.	gr. 1/4	0.015
ext. fl.	♏ 1	0.050
tinct.	♏ 10	0.600
Oil, Cod Liver	ʒ 4	16.000
emulsion	ʒ 2	8.000
w. hypophos.	ʒ 2	8.000
Oil, Castor	ʒ 4	16.000
Oil, Cottonseed	ʒ 4	16.000
Oil, Croton	♏ 1	0.050
Oil, Linseed	℥ 1	30.000
Oil, Olive	℥ 1	30.000
Oil, Sandalw	♏ 8	0.500
Oil, Turpentine	♏ 15	1.000
emuls.	ʒ 1	4.000
Opium	gr. 1	0.065
acet.	♏ 8	0.500
ext.	gr. 1/2	0.030
pil.	No. 1	
pulv.	gr. 1	0.065
tinct.	♏ 8	0.500
tinct. camph.	ʒ 2	8.000
tinct. deod.	♏ 8	0.500
vin.	♏ 8	0.500
Orexin	gr. 2–5	0.133–0.333
Orphol	gr. 10–15	0.666–1.000
Orthoform	gr. 8	0.500
Pancreatin	gr. 7 1/2	0.500
Papain	gr. 2–10	0.133–0.666
Paraformaldehyd	gr. 10–20	0.666–1.333
Paraldehyd	♏ 30	2.000
Pareiræ, ex. fl.	♏ 30	2.000
Pelletierine tan.	gr. 4	0.250
Pellotin	gr. 1/2–1	0.033–0.066
Pepo	ʒ 8	30.000
Pepsin, liq.	ʒ 2–4	8.000–16.000
pur.	gr. 4	0.250
sacch.	gr. 15	1.000
Peronin	gr. 1/3–1	0.022–0.066
Phenacetin	gr. 7 1/2	0.500
Phenocoll	gr. 5–10	0.333–0.666
Phenol	gr. 1	0.065
glycerit	♏ 5	0.300
Phenyl salicylat	gr. 7 1/2	0.500
Phosphorus	gr. 1/128	0.0005
pil.	No. 1	
elix.	ʒ 1	4.000
spirit	♏ 3	0.200
tinct.	♏ 3	0.200
oleum	♏ 1	0.050

Remedies	Dose. Apoth.	Dose. Metric
Physostig. ext.	gr. 1/8	0.008
ext. fl.	♏ 2	0.100
tinct.	♏ 15	1.000
Physostigmin. salic., sul.	gr. 1/64	0.001
Phytolac. ex. fl. emetic	♏ 15	1.000
alterat.	♏ 1 1/2	0.100
Pichi. ext.	gr. 5–10	0.333–0.666
ex. fl.	ʒ 1/2–2	2.000–8.000
Picis liq., liq. and vin	ʒ 1–4	4.000–16.000
ol.	♏ 3	0.200
syr.	ʒ 1	4.000
Picrotoxin	gr. 1/64–1/40	0.001–0.002
Pilocarpi, ex. fl.	♏ 30	2.000
Pilocarpin hydrochl.	gr. 1/5	0.010
Pimenta	gr. 15	1.000
oleum	♏ 3	0.200
Piper., oleores.	♏ 1/2	0.030
Piperidin guaiacolat.	gr. 6–20	0.400–1.333
Piperazin	gr. 15	1.000
Piperin	gr. 3	0.200
Piscidiæ, ex. fl.	♏ 15–60	1.000–4.000
Plumb. acetas	gr. 1	0.065
Podophyll.	gr. 8	0.500
ext. fl.	♏ 8	0.500
res., purg.	gr. 1/4	0.015
laxat.	gr. 1/10	0.005
Pod. bellad. and Caps.	Pil. No. 1	
Polygon., ext.	gr. 1–5	0.066–0.333
ext. fl.	♏ 10–60	0.666–4.000
Potass. acetas	gr. 30	2.000
arsen., liq.	♏ 3	0.200
bicarb.	gr. 30	2.000
bitart. (diu.)	gr. 30	2.000
brom.	gr. 15	1.000
carb.	gr. 15	1.000
chloras	gr. 4	0.250
citras	gr. 15	1.000
citras, liq	ʒ 4	16.000
citras, efferv.	ʒ 1	4.000
cyanid.	gr. 1/5	0.010
dichromat.	gr. 1/5	0.010
et sod. tart.	ʒ 2	8.000
ferrocyanid.	gr. 7 1/2	0.500
hydrox. liq.	♏ 15	1.000
hypophosph.	gr. 7 1/2	0.500
iodid.	gr. 7 1/2	0.500
liquor	♏ 15	1.000
nitras	gr. 7 1/2	0.500
permang.	gr. 1	0.065
sulphas	gr. 30	2.000
sulphid	gr. 1–10	0.066–0.666
Protargol	0.5–2% sol. for inject.	

Remedies	Dose. Apoth.	Dose. Metric
Prun. virg.	gr. 30	2.000
ext. fl.	♏ 30	2.000
infus.	℥ 2	60.000
syr.	ʒ 1	4.000
Pulsatil. ex. fl.	♏ 4	0.250
Pyoktanin	gr. 2–10	0.100–0.600
Pyramidon	gr. 8–30	0.533–2.000
Pyrantin	gr. 1–3	0.066–0.200
Pyrethrum	gr. 30	2.000
Quassiæ, ext.	gr. 1	0.065
ext. fl.	♏ 8	0.500
tinct.	♏ 30	2.000
Quebracho, ex.	gr. 2–8	0.133–0.533
ext. fl.	♏ 5–60	0.333–4.000
tinct.	ʒ 1–4	4.000–16.000
vin.	ʒ 1–4	4.000–16.000
Quebrachin	gr. 3/5–1 1/2	0.050–0.100
Quercus alb.	gr. 15	1.000
fld. ext.	♏ 15	1.000
Quinidin, sulph.	gr. 1–30	0.066–2.000
Quinin	gr. 4	0.250
arsen.	gr. 1/6–1	0.011–0.066
bisulphas	gr. 4	0.250
hydrobromas	gr. 4	0.250
hydrochloras	gr. 4	0.250
salicylas	gr. 4	0.250
sulphas	gr. 4	0.250
valerate	gr. 1–3	0.066–0.200
Resorcinol	gr. 2	0.125
Rhamnus pursh. ext.	gr. 4	0.250
fl. ext.	♏ 15	1.000
arom.	♏ 15	1.000
Rheum.	gr. 15	1.000
ext.	gr. 4	0.250
ext. fl.	♏ 15	1.000
mist. et sod.	ʒ 1	4.000
pil. comp.	No. 2	
pulv. comp.	gr. 30	2.000
syr.	℥ 2	8.000
syr. arom.	℥ 2	8.000
tinct.	ʒ 1	4.000
tinct. arom.	♏ 30	2.000
tinct. dulc.	ʒ 1	4.000
Rhois aromat. ex. fl.	♏ 10–60	0.666–4.000
glab., ex. fl.	♏ 15	1.000
tox., ext. fl.	♏ 1/10–1	0.006–0.066
tox., tinct.	♏ 1–6	0.066–0.400
Rosæ, ext. fl.	♏ 30	2.000
syr.	ʒ 1–2	4.000–8.000
Rubidii iodid	gr. 1–5	0.066–0.333
Rubi, ext. fl.	♏ 15	1.000
syr	ʒ 1	4.000

Remedies	Dose. Apoth.	Dose. Metric
Rumic., ex. fl.	♏ 15–60	1.000–4.000
Rutæ, ext. fl.	♏ 15–30	1.000–2.000
oleum	♏ 1–5	0.066–0.333
Sabal	gr. 15	1.000
Sabinæ, ext. fl.	♏ 5	0.300
oleum	♏ 3	0.200
Saccharin	gr. 4	0.250
Safrol	♏ 5	0.300
Salacetol	gr. 20–30	1.333–2.000
Salicinum	gr. 15	1.000
Saligenin	gr. 5–8	0.333–0.533
Salipyrin	gr. 5–30	0.333–2.000
Salol	gr. 7 1/2	0.500
Salophen	gr. 7 1/2	0.500
Sanguin., acet.	♏ 10–30	0.666–2.000
ext. fl.	♏ 1 1/2	0.100
tinct.	♏ 15	1.000
Sanguinarin	gr. 1/12–1/4	0.005–0.016
Santal., ex. fl.	ʒ 1–2	4.000–8.000
oleum	♏ 8	0.500
Santonica	gr. 5–60	0.333–4.000
ext. fl.	♏ 15–60	1.000–4.000
Santoninum	gr. 1	0.065
Sarsap., ex. fl.	♏ 30	2.000
ext. fl. comp.	♏ 30	2.000
syr. comp.	ʒ 4	16.000
Sassafras, ex. fl	ʒ 2	8.000
oleum	♏ 3	0.200
Saw palmetto, ex.	gr. 3–5	0.200–0.333
ex. fl.	ʒ 1/2–2	2.000–8.000
Scammonium	gr. 4	0.250
res.	gr. 3	0.200
Scilla	gr. 2	0.125
acet.	♏ 15	1.000
ext. fl.	♏ 1 1/2	0.100
ext. fl. comp.	♏ 5–30	0.333–2.000
syr.	♏ 30	2.000
syr. comp.	♏ 30	2.000
tinct.	♏ 15	1.000
Scopola	gr. 3/4	0.045
ext.	gr. 1/5	0.010
fluid ext.	♏ 1	0.050
Scopar., ex. fl.	♏ 15	1.000
Scoparin	gr. 1/2–1	0.033–0.066
Scopolamine hydrobrom.	gr. 1/128	0.0005
Scutellar. ex. fl.	ʒ 1/2–2	2.000–8.000
Senegæ, ext. fl.	♏ 15	1.000
syr.	ʒ 1	4.000
Senna	ʒ 1	4.000
confect.	ʒ 1	4.000
ext. fl.	♏ 30	2.000
infus. comp.	ʒ 4	120.000
syr.	ʒ 1	4.000

Remedies	Dose. Apoth.	Dose. Metric
Serpent. ex. fl.	♏ 15	1.000
tinct.	℥ 1	4.000
Serum, antidiphther.	3000 units	
immunizing dose	500 units	
Sinapis alba (emet.)	℥ 2	8.000
nig. (emet.)	℥ 2	8.000
vol. ol.	♏ 1/8	0.008
Soda, liq.	♏ 15	1.000
Sod. acetas	gr. 15	1.000
arsenas	gr. 1/10	0.005
exsic.	gr. 1/20	0.003
arsenat, liq.	♏ 3	0.200
benzoas	gr. 15	1.000
bicarb.	gr. 15	1.000
bisulphit	gr. 7 1/2	0.500
boras	gr. 7 1/2	0.500
brom.	gr. 15	1.000
cacodylat.	gr. 1/4–1/2	0.016–0.033
carb. monoh.	gr. 4	0.250
chloras	gr. 4	0.250
chlorin, liq.	♏ 15	1.000
chlorid. (emet.)	℥ 4	16.000
citras	gr. 15	1.000
glycerophos	gr. 3–5	0.200–0.333
hydrox. liq.	♏ 15	1.000
hypophosph.	gr. 15	1.000
hyposulph.	gr. 15	1.000
iodid.	gr. 7 1/2	0.500
nitras.	gr. 15	1.000
nitris.	gr. 1	0.065
phenolsulph.	gr. 4	0.250
phosphas.	gr. 30	2.000
phos. efferv.	℥ 2	8.000
phos. comp. liq.	℥ 2	8.000
pyrophos.	gr. 30	2.000
salicylas	gr. 15	1.000
santoninas	gr. 1–2	0.050–0.100
sulphas	℥ 4	16.000
sulphis	gr. 15	1.000
sulpho-carb.	gr. 4	0.250
thiosulph	gr. 15	1.000
Solan. carolin., ex. fl.	♏ 20–60	1.333–4.000
Solanin	gr. 1/6–1	0.011–0.066
Somatose	ʒ 1/2–1	15.000–30.000
Somnal	♏ 30–℥ 2	2.000–8.000
Sparteine sul.	gr. 1/5	0.010
Spigeliæ, ex. fl.	℥ 1	4.000
et sen., ex. fl.	℥ 1/2–2	2.000–8.000
infus. comp.	℥ 1–3	32.00–96.000
Spiritus æth.	℥ 2	8.000
ætheris com	℥ 1	4.000
ætheris nit.	♏ 30	2.000

Remedies	Dose. Apoth.	Dose. Metric
Staphisagria	gr. 1	0.065
fluid ext.	♏ 1	0.050
Stillingiæ, ex. fl.	♏ 30	2.000
tinct.	ʒ 1/2–1	2.000–4.000
Stramon., ext.	gr. 1/5	0.010
ext. fl.	♏ 1	0.050
tinct.	♏ 8	0.500
Strontii bromide	♏ 15	1.000
iodid.	♏ 7 1/2	0.500
lactat.	♏ 10–20	0.666–1.333
salicylat	♏ 15	1.000
Strophanthus	gr. 1	0.065
tinct.	♏ 8	0.500
Strophanthin	gr. 1/200	0.0003
Strychnine and salts	gr. 1/64	0.001
Styrax	gr. 15	1.000
Succin., oleum	gtt. 5–10	0.333–0.666
Sulphonal	gr. 15	1.000
Sulphonethylmethane	gr. 15	1.000
Sulphonmethane	gr. 15	1.000
Sulphur	gr. 60	4.000
iodide	gr. 1/2	0.030
Sumbul, ex. fl.	♏ 30	2.000
ext.	gr. 4	0.250
tinct.	♏ 5–30	0.333–2.000
Suprarenal, ex.	gr. 4	0.250
Syr. hypophos.	ʒ 2	8.000
hypophos. comp.	ʒ 2	8.000
Taka-diastase	gr. 2–5	0.133–0.333
Tamarind	ʒ 4	16.000
Tanacet., ol.	gtt. 1–3	0.066–0.200
Tannalbin	ʒ 1/2–2	2.000–8.000
Tannigen	gr. 5–15	0.333–1.000
Taraxac., ext.	gr. 15	1.000
ext. fl.	ʒ 2	8.000
Terebinth., ol.	♏ 15	1.000
Terebene	♏ 8	0.500
Terpin hydr.,	gr. 2	0.125
Tetronal	gr. 15	1.000
Turpent. Chian	gr. 3–5	0.200–0.333
Thallin	gr. 2–15	0.133–1.000
Theobromin.	gr. 5–15	0.333–1.000
sodio-salicyl.	gr. 10–20	0.650–1.330
Theocin	gr. 5–15	0.300–1.000
Thiocol	ʒ 1/2–1	2.000–4.000
Thiol	gr. 3–10	0.200–0.666
Thymi oleum	♏ 3	0.200
Thymol	gr. 2	0.125
Thymus ex	gr. 20–30	1.333–2.000
Thyroid, ex.	gr. 4	0.250
Tiglii, oleum	♏ 1	0.050
Tolu, syr	ʒ 4	16.000
tinct.	♏ 30	2.000

Remedies	Dose. Apoth.	Dose. Metric
Tolysol	gr. 2–5	0.133–0.333
Trimethylam. hydrochl.	gr. 1–3	0.066–0.200
Trional	gr. 15	1.000
Tritic., ex. fl.	ʒ 2	8.000
Tuberculin	gr. 1/250–1/65	0.00026–0.004
Tussol	gr. 5–10	0.333–0.666
Uranii nitrat.	gr. 1/4–1/2	0.016–0.033
Urethan	gr. 15	1.000
Urotropin	gr. 4	0.250
Ustilag. ext. fl.	♏ 15–60	1.000–4.000
Uvæ urs. ex. fl.	♏ 30	2.000
Valerian., ext.	gr. 5–10	0.333–0.666
ext. fl.	♏ 30	2.000
tinct.	ʒ 1	4.000
tinct. amm.	♏ 30	2.000
Vanillin	gr. 1/2	0.030
Verat. vir. ex. fl.	♏ 1 1/2	0.100
tinct., 10%	♏ 15	1.000
Veratrine	gr. 1/30	0.002
Veronal	gr. 5–15	0.300–1.000
Viburn, opulus	gr. 30	2.000
prunif	gr. 30	2.000
ext. fl.	ʒ 1/2	2.000
Xanthoxy, ex. fl.	♏ 30	2.000
Xeroform	gr. 5–15	0.333–1.000
Xylol	♏ 5–15	0.333–1.000
Yohimbin	gr. 1/6–1/3	0.010–0.020
Zinci acet.	gr. 1/2	0.125
Zinc bromid.	gr. 2	0.125
iodid.	gr. 1	0.065
oxid.	gr. 4	0.250
phenolsulph.	gr. 2	0.125
phosphid.	gr. 1/30	0.002
sulphas (em.)	gr. 15	1.000
sulphocarb.	gr 2	0.125
valerianas	gr 2	0.125
Zingib., ext. fl.	♏ 15	1.000
oleores	gr. 1/2	0.030
syr.	ʒ 4	16.000
tinct.	♏ 30	2.000

POISONS.

SYMPTOMS AND ANTIDOTES.

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

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

When the nature of the poison is unknown, a general antidote, consisting of equal parts of calcined magnesia, pulverized charcoal, and hydrated peroxide of iron, which are to be diffused in water, may be freely administered, and will, in the majority of cases, prove efficient, as one or another of them is an antidote to most of the mineral poisons.

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

ACIDS (*Mineral*).

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

Antidotes.—First water to dilute the acid, followed by a solution of chalk or magnesia; no carbonates; emollient drinks;

demulcents; stimulants and, if required, morphine hypodermically for pain; milk; flaxseed tea; barley water; fixed oil and fatty matter; plaster off wall, in emergency; strong soap suds; olive oil; no emetics or stomach pump.

ACONITE.

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

Antidotes.—Emetics; stimulants, external and internal, such as atropine, ammonia, digitalis, nux vomica sulphate of zinc, tannic acid, animal charcoal; galvanism; whiskey; strychnine subcutaneously; head low, feet high, extremities warm; strong tea or coffee, with powdered charcoal.

ALKALIES (*See Potash*).

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

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

Antidotes.—Empty stomach quickly with tube, or apomorphine 1/10 to 1/20 subcutaneously; strong tea; oak bark tea; or 20 grains of tannic acid to 3 fl. ounces of warm water. Vegetable acids, such as tannic acid, catechu, nutgalls, white oak bark, kino, cinchona.

AMMONIA.

Aqua Ammonia.

Symptoms.—Irritation of air passages and stomach, with pain, vomiting and purging; prostration.

Antidotes.—Water to dilute poison, followed by lemon juice or acetic acid (vinegar). Demulcents; anodynes; stimulants.

ARSENIC.

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

Antidotes.—Freshly precipitated hydrated sesquioxide of iron (made by adding magnesia to any iron solution); animal charcoal; ammonia; lime water stomach pump; artificial respiration; cold effusion emetics; milk; raw eggs; demulcents; anodynes; stimulants; warmth; mustard, or zinc sulphate 20 gr. to 1 fl. ounce of warm water.

ARGENTI NITRAS (*Nitrate of Silver*).

Symptoms.—Corrosion of parts; nausea and vomiting; convulsions; gastric irritation; diarrhœa; paralysis.

Antidotes.—Solution of common salt in demulcent (mucilaginous) drinks; white of egg; milk; flaxseed tea; morphine.

ATROPINE.

Symptoms.—Insatiable thirst, with dryness of mouth and throat; nausea; giddiness; palpitation of heart; intensely dilated pupil; spectral illusions; flushed face; hurried respiration; delirium; convulsions; stupor; coma and death.

Antidotes.—Emetics or stomach pump; tannic acid; sulphate of copper (gr. x); cold to head; ammonia, externally and internally; opium; animal charcoal; calabar bean; stimulants; artificial respiration; hypodermic injection of morphia or pilocarpine; mustard flour in water; cold to head.

BELLADONNA.

Symptoms.—Same as those of atropine. (See Atropine.)

Antidotes.—Same as for atropine. (See Atropine.)

CAMPHOR.

Symptoms.—Vertigo; abdominal pain; delirium; stupor; sweating; convulsions.

Antidotes.—Emetics followed by castor oil or sulphate of magnesia; stimulants.

CANNABIS INDICA (*Indian Hemp*).

Symptoms.—Temporary insanity, or hilarity as shown by a singular gait, a constant rubbing of hands, and other strange

actions, a peculiar and cunning appearance of the eyes, great hunger, dilated pupils, drowsiness.

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

CANTHARIDES.

Symptoms.—A burning pain from irritations of the stomach; vomiting and purging; blood-stained urine; pain in loins, strangury; priapism; convulsions; death.

Antidotes.—Emetics; emollient or mucilaginous drinks; opiates by mouth and rectum; opium; cocaine; belladonna; morphine hypodermically; or anesthetics; leeches to epigastrium; warm baths; diuretics; cathartics; venesection, if necessary; no oils.

CARBOLIC ACID.

Symptoms.—When taken internally, it causes pain in the head and stomach, followed by unconsciousness, weak pulse, dyspnea; a whitened and shriveled appearance of the mucous membrane of the lips, mouth and throat; sometimes vomiting; contracted pupils; stertorous breathing; coma, and death within a period of from five to ten minutes to eight or ten hours, according to the quantity of the acid swallowed.

Antidotes.—Olive oil; castor oil; lime water; saccharate of lime; precipitated carbonate of lime; albuminous and mucilaginous substances; any soluble sulphate, such as magnesia; emesis; demulcents; stimulants.

CHLORINE WATER.

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

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

CHLORAL.

Symptoms.—Excitement; delirium; flushed face; cramps in limbs; eyes closed; profound unconsciousness; stupor; pupil first contracted, then dilated; slow respiration, or later rapid and

shallow; stertorous breathing; increasing feebleness; lividity of countenance; loss of pulse; pallor; coldness of extremities; muscular relaxation; death from cardiac syncope.

Antidotes.—Nitrate of amyl, when the poison has been taken in large quantity; strychnia, when the action of the poison is slow and culminative; emesis or stomach pump; external warmth; mustard to stimulate reflexes; slapping; friction; faradization; atropine; artificial respiration; inhalation of oxygen. According to some authorities, picrotine, 1/20 gr., sufficient for 30 grs. of chloral; strong coffee.

CHLOROFORM.

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

Antidotes.—Fresh air; artificial respiration (inclining head down, tongue pulled forward), cold water dashed over face and chest; galvanism to pneumogastric and through diaphragm (one pole may be applied to nape of neck and the other to the pit of the stomach); brandy and ammonia enemata; hypodermic injection of 15♏ of tincture of digitalis, and 1/60 gr. of atropine, or hypodermic injection of 1 drachm of ether; inhalation of nitrate of amyl; tracheotomy.

COCAINE AND EUCAINE.

Antidotes.—Apomorphine subcutaneously or stomach tube; strong oak bark or walnut leaf tea; morphine subcutaneously; stimulants; amyl nitrite to nostrils.

CONIUM (*Hemlock*).

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

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

CORROSIVE SUBLIMATE.

Symptoms.—Heat and pain of a burning nature in mouth, and throat, and stomach; nausea; swollen and painful abdomen; purging; vomiting of bloody mucus; diarrhœa; dysentery; muscular cramps; bloody discharges; convulsions; coma and death.

Antidotes.—Albumen; milk; white of egg (white of 1 egg to every 4 grs. of corrosive sublimate taken); flour; perchloride of tin; iron and zinc (iron filings 2 parts and zinc 1 part); wheat flour paste; demulcents; morphine hypodermically; stimulants; external friction; emetics; stomach-pump.

CREASOTE (*See Carbolic Acid*).

CROTON OIL.

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

Antidotes.—Emetic of sulphate of copper, 10 grs., followed by mucilaginous fluids containing opium, to allay the pain, olive oil; opium; demulcents; anodynes; morphine hypodermically.

SULPHATE OF COPPER.

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

Antidotes.—Albumen or white of egg; yellow prussiate of potash, or soap.

DIGITALIS.

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

Antidotes.—Recumbent posture after the use of such emetics as sulphate of zinc; stimulate internally and externally; tannic acid; animal charcoal; tincture of aconite.

FORMALIN.

Symptoms.—Severe pain in the thorax and stomach; vomiting.

Antidotes.—The free use of warm water; washing out of stomach with tube; ammonia; demulcents; anodynes.

HYDROCYANIC ACID.

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

Antidotes.—Fresh air and artificial respiration, with cold affusion upon head and neck; stomach pump; freshly precipitated oxide of iron, with an alkaline carbonate, such as carbonate of ammonia; chlorine; ammonia by inhalation and injection in vein of leg; mixture of persulphate and protosulphate of iron.

HYOSCYAMUS.

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

Antidotes.—Stomach pump; emetics; stimulants, external and internal; lemon juice; strong coffee. (*See Atropine Poisoning.*)

IODINE.

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

Antidotes.—Emetics and demulcent drinks; diluents; anodynes; stimulants; starch paste or flour diffused in water; albumen; milk; opium and external heat.

LEAD SALTS.

Symptoms.—A dry and constricted throat; pain in stomach and bowels; severe colic; constipation; convulsions; paralysis of extensor muscles; apoplectic symptoms.

Antidotes.—Any soluble sulphate, either magnesia or soda; Epsom salts, followed by emetics, and afterwards opium and milk; iodide of potassium; dilute sulphuric acid.

MORPHINE (*See Opium*).

MERCURY.

When in the form of the bichloride (corrosive sublimate), or nitrate of mercury. (*See Corrosive Sublimate Poisoning.*)

NITRITE OF AMYL.

Symptoms.—Flushing of face followed by pallor; dilated pupils; relaxation of muscles; irregular respiration; slow and weak pulse; cyanosis may occur.

Antidotes.—Stimulants; artificial respiration; external warmth.

NUX VOMICA.

Symptoms.—Restlessness; spasmodic twitching of muscles; violent movement of limbs; tetanic spasms; dyspnœa; death.

Antidotes.—Evacuate stomach; free use of tannic acid followed by a prompt emetic; thirty grains of chloral and 60 grains of bromide of potassium, nitrate of amyl. Patient kept quiet.

OPIUM.

Symptoms.—At first slight excitement followed by drowsiness and stupor; increasing drowsiness, giddiness, and stupor; insensibility; stertorous breathing; feeble pulse; contracted pupil; slow respiration; slow pulse; flushed face; coma; convulsions; death.

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

OXALIC ACID.

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

Antidotes.—Chalk; magnesia; plaster from wall in emergency; carbonate of lime; lime water; anodynes; demulcents; stimulants; not potash or soda; emetics; stomach pump.

PHOSPHORUS.

Symptoms.—Weakness; nausea; vomiting; gastric irritation; jaundice; delirium; convulsions; burning pain along alimentary tract; corrosion of tissues; vomiting of mucus and blood; diarrhœa; coma; death.

Antidotes.—Sulphate of copper, 3 grains every 5 minutes in dilute solution to cause emesis; oil of turpentine followed by a saline cathartic; emetics and purgatives.

POTASH AND SODA SALTS.

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

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

STRAMONIUM (*See Belladonna*).

STRYCHNINE.

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

Antidotes.—Chloroform; belladonna; tincture of aconite; morphine; 8 grs. morphine antidote to 1 gr. strychnia; extract of conium; also same as nux vomica. (*See Nux Vomica Poisoning.*)

TOBACCO.

Symptoms.—Nausea; vomiting; violent retching.

Antidotes.—Emetics; stimulants, both external and internal; strychnia; external heat. (*See Aconite.*)

ZINC SALTS.

Zinc Chloride and Zinc Sulphate.

Symptoms.—A burning sensation in stomach; gastric irritation; nausea; vomiting; anxious countenance; difficult breathing; small, quick pulse; cold perspiration; nervous symptoms; syncope; collapse; convulsions; death.

Antidotes.—Dilute solutions of carbonate of sodium or potassium; emetics; warm demulcent drinks; anodynes and stimulants.

UNKNOWN POISON.

Treatment.—Emetic; bland liquids; stimulation.

THE PULSE.

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

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

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

The "radial pulse" is the one usually selected, although the "temporal pulse" is also noted in the administration of anæsthetic agents. The pulse in other vessels must also sometimes be observed, as in the brachial, the facial in front of the masseter muscle, the posterior tibial, the dorsalis pedis, the carotid and femoral arteries.

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

When the pulse is to be observed, the patient should be either sitting or lying down. The observer should place his index,

middle, or ring finger lightly upon the pulse, and should then appreciate the state of the coats of the artery, and should next note the frequency, the rhythm, the tension, volume and force of the pulse; and, lastly, any peculiarities, if present. Moreover, the pulse of one side of the body should always be compared with the other.

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

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

This can be conveniently done in the temporal artery.

In noting the pulse of the wrist, asleep or awake, there are often involuntary movements of the arm and twitching of the muscles, which render it difficult to keep the finger of the observer on the pulse. This difficulty may be overcome in a great degree by grasping the entire hand of the child, and then extending the index finger upon the pulse. It is also advisable not to take the pulse of the patient until some little time has elapsed after the appearance of the observer. In health, changes in the frequency and rhythm of the pulse are often met with. The normal pulse in an adult is about 75 beats per minute, while in infants it ranges from 120 to 140 beats per minute; and the very old have a much higher pulse-rate than those of middle age.

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

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

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

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

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

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

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

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

A pulse of 90 or more may be regarded as a pulse of abnormal frequency in an adult. There are exceptions to this, but they are rare. If the pulse is quicker than the temperature will explain, it indicates cardiac weakness.

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

Under the age of fifteen, any disease of the lungs is almost invariably accompanied by great frequency of the pulse, so that

a pulse of 120 to 140 would not be considered as so serious in significance as if it occurred in an older person.

A soft, rapid, small pulse indicates great weakness, and an irregular or intermittent pulse indicates functional or organic disease of the heart.

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

RESPIRATION AT VARIOUS STAGES.

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

THERMOMETERS.

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

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

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

The following diagram will explain the variance:—

Fahrenheit	.0.	32	77	122	167	212
Centigrade	17.77	0	25	50	75	100
Reaumur	14.22	0	20	40	60	80

When a thermometer, in the process of vulcanizing, gives trouble by the column of mercury becoming divided, the divided portion remaining in the top of the tube, the best method is to unscrew the thermometer and turn it upside down, and make the mercury in the bulb unite with the mercury in the tube, so that it may coalesce perfectly. This is a better method than striking the thermometer sharply in the hollow of the left hand, and thereby risking the breaking of the thin glass tube.

Temperature.—The Clinical Thermometer is employed as a valuable means of diagnosis and prognosis. It is valued because the vital processes can only be normally and perfectly performed at the temperature of 98.5°, and just in proportion as it varies from this, either above or below, they are changed or entirely arrested. This standard of temperature, 98.5°, of the healthy body, is subject to slight variations during the day. A temperature of 105° is usually considered dangerous and 107° is generally fatal; any rise above the normal indicates fever, and a decrease indicates shock or collapse. Although observations show that the normal heat, which is the most essential condition of life, may be considerably altered by a number of circumstances, yet the variations in health are generally temporary and within narrow limits, whereas those which arise from disease are persistent during the continuance of the abnormal condition. Both increase and decrease of temperature have to be considered, for while an increase of four to six degrees may be maintained for a month, and not endanger life, a decrease of but one degree, if maintained for a considerable time, will result in death. The temperature in fevers is highest in the evening and lowest in the morning. But in the fever resulting from difficult dentition the temperature is highest in the morning and lowest in the evening. The increase in temperature of the body is usually proportionate to the frequency of the pulse, one degree corresponding to an increase of ten beats per minute. Thus—

With a temperature of 98°, we have a pulsation of 60.
With a temperature of 99°, we have a pulsation of 70.
With a temperature of 100°, we have a pulsation of 80.
With a temperature of 101°, we have a pulsation of 90.
With a temperature of 102°, we have a pulsation of 100.
With a temperature of 103°, we have a pulsation of 110.
With a temperature of 104°, we have a pulsation of 120.

TABLE OF ELEMENTARY SUBSTANCES.

Elements	Symbol	Atomic Weight	Equivalent	Elements	Symbol	Atomic Weight	Equivalent
Aluminum	Al	27	13.5	Molybdenum	Mo	95.5	42.75
Antimony	Sb	120	120	Nickel	Ni	58	29
Arsenic	As	75	75	Niobium	Nb	94	94
Barium	Ba	137	68.4	Nitrogen[3]	N	14.03	14
Berylium (Glucinum)	Be	9	9	Osmium	Os	198.5	99.25
				Oxygen[4]	O	16	8
Bismuth	Bi	208.5	208.5	Palladium	Pd	105.7	52.85
Boron	B	11	11	Phosphorus	P	31	31
Bromine	Br	79.95	79.95	Platinum	Pt	194.4	97.2
Cadmium	Cd	111.8	55.9	Potassium	K	39.11	39.11
Cesium	Cs	132.6	132.6	Rhodium	Rh	104.1	52.05
Calcium	Ca	40	20	Rubidium	Rb	85.3	85.3
Carbon[1]	C	12	6	Ruthenium	Ru	104.2	52.1
Cerium	Ce	140.2	70.5	Scandium	Sc	44	22
Chlorine[2]	Cl	35.45	35.45	Selenium	Se	78.8	39.4
Chromium	Cr	52.1	26.2	Silicon	Si	28.4	14
Cobalt	Co	58.9	29.45	Silver	Ag	107.92	107.92
Copper	Cu	63.4	31.6	Sodium	Na	23.05	23.05
Didymium	Di	144.6	72.3	Strontium	Sr	87.4	43.7
Erbium	E	165.9	82.95	Sulphur[5]	S	32.06	16
Fluorine	Fl	19	19	Tantalum	Ta	182	182
Gallium	G	68.8	34.4	Tellurium	Te	128	64
Gold	Au	197.3	197.3	Thallium	Tl	203.7	203.7
Hydrogen	H	1.007	1.007	Thorium	Th	233	116.5
Indium	In	113.4	56.7	Tin	Sn	117.7	58.85
Iodine	I	126.85	126.85	Titanium	Ti	48	24
Iridium	Ir	192.7	96.35	Tungsten	Tr	183.6	91.8
Iron	Fe	56	27.95	Uranium	U	238.5	119.25
Lanthanum	La	138.5	138.5	Vanadium	V	51.3	51.3
Lead	Pb	206.95	103.25	Ytterbium	Yb	172.7	172.7
Lithium	Li	7.02	7.02	Yttrium	Y	89.8	89.8
Magnesium	Mg	24.3	12	Zinc	Zn	65.3	32.45
Manganese	Mn	55	27	Zirconium	Zr	90	45
Mercury	Hg	200	99.85				

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

TABLE OF THE SOLUBILITY OF CHEMICALS IN WATER AND ALCOHOL.

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

CHEMICALS	WATER		ALCOHOL	
	At 15° C. (50° F.)	Boiling	At 15° C. (50° F.)	Boiling
One part is soluble in:	Parts	Parts	Parts	Parts
Acidum arseniosum	30.80	15	sp.	sp.
Acidum benzoicum	500	15	3	1
Acidum boricum	25	3	15	5
Acidum carbolicum	20	. .	v. s.	v. s.
Acidum chromicum	v. s.	v. s.	dec.	dec.
Acidum citricum	0.75	0.5	1	0.5
Acidum gallicum	100	3	4.5	1
Acidum salicylicum	450	14	2.2	v. s.
Acidum tannicum	6	v. s.	0.6	v. s.
Acidum tartaricum	0.7	0.5	2.5	0.2
Alumen	10.5	ins.	0.3	ins.
Alumen exsiccatum	20	ins.	0.7	ins.
Ammonii carbonas	4	dec.	dec.	dec.
Ammonii nitras	0.5	v. s.	20	3
Ammonii valerianas	v. s.	v. s.	v. s.	v. s.
Antimonii et potassii tartras	17	3	ins.	ins.
Argenti cyanidum	ins.	ins.	ins.	ins.
Argenti iodium	ins.	ins.	ins.	ins.
Argenti nitras	0.8	0.1	26	5
Argenti nitras fusus	0.6	0.5	25	5
Argenti oxidum	v. sp.	v. sp.	ins.	ins.
Atropina	600	35	v. s.	v. s.
Atropinæ sulphas	0.4	v. s.	6.5	v. s.
Bismuth subnitras	ins.	ins.	ins.	ins.
Bromum	33	. .	dec.	dec.
Calcii bromidum	0.7	v. s.	1	v. s.
Calcii carbonas præcipitatus	ins.	ins.	ins.	ins.
Calcii chloridum	1.5	v. s.	8	1.5
Calcii hypophosphis	6.8	6	ins.	ins.
Calcii phosphas præcipitatus	ins.	ins.	ins.	ins.
Calx	750	1300	ins.	ins.
Camphora monobromata	alm. ins.	alm. ins.	v. s.	v. s.
Chloral	v. s.	v. s.	v. s.	v. s.
Cinchonidinæ sulphas	100	4	71	12
Cinchonina	alm. ins.	alm. ins.	110	28
Cinchoninæ sulphas	70	14	6	1.5
Codeina	80	17	v. s.	v. s.
Creta præparata	ins.	ins.	ins.	ins.
Cupri acetas	15	5	135	14
Cupri sulphas	2.6	0.5	ins.	ins.
Ferri chloridum	v. s.	v. s.	v. s.	v. s.
Ferri citras	s.	v. s.	ins.	ins.
Ferri lactas	40	12	alm. ins.	alm ins.
Ferri sulphas	1.8	0.3	ins.	ins

TABLE OF THE SOLUBILITY OF CHEMICALS IN WATER AND ALCOHOL.—*Continued.*

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

TABLE OF THE SOLUBILITY OF CHEMICALS IN WATER AND ALCOHOL.—*Continued.*

CHEMICALS	WATER		ALCOHOL	
	At 15° C. (50° F.)	Boiling	At 15° C. (50° F.)	Boiling
One part is soluble in:	Parts	Parts	Parts	Parts
Potassii ferrocyanidum	4	2	ins.	ins.
Potassii hypophosphis	0.6	0.3	7.3	3.6
Potassii iodidum	0.8	0.5	18	6
Potassii nitras	4	0.4	alm. ins.	alm. ins.
Potassii permanganas	20	3	dec.	dec.
Potassii sulphas	9	4	ins.	ins.
Potassii tartras	0.7	0.5	alm. ins.	alm. ins.
Quinidinæ sulphas	100	7	8	v. s.
Quinina	1600	700	6	2
Quininæ bisulphas	10	v. s.	32	v. s.
Quininæ hydrochloras	34	1	3	v. s.
Quininæ sulphas	740	30	65	3
Quininæ valerianas	100	40	5	1
Saccharum	0.5	0.2	175	28
Saccharum lactis	7	1	ins.	ins.
Salicinum	28	0.7	30	2
Soda	1.7	0.8	v. s.	v. s.
Sodii acetas	3	1	30	2
Sodii bicarbonas	12	dec.	ins.	ins.
Sodii boras	16	0.5	ins.	ins.
Sodii carbonass	1.6	0.25	ins.	ins.
Sodii chloras	1.1	0.5	40	43
Sodii chloridum	2.8	2.5	alm. ins.	alm. ins.
Sodii hypophosphis	1	0.12	30	1
Sodii hyposulphis	1.5	0.5	ins.	ins.
Sodii iodidum	0.6	0.3	1.8	1.4
Sodii nitras	1.3	0.6	sp.	40
Sodii sulphas	2.8	0.4	ins.	ins.
Sodii sulphis	4	0.9	sp.	sp.
Strychnina	6700	25,000	110	12
Strychninæ sulphas	10	2	60	2
Sulphur lotum	ins.	ins.	ins.	ins.
Sulphur præcipitatum	ins.	ins.	ins.	ins.
Sulphur sublimatum	ins.	ins.	ins.	ins.
Thymol	1200	900	1	v. s.
Veratrina	v. sp.	v. sp.	3	v. s.
Zinci acetas	3	1.5	30	3
Zinci carbonas præcipitatus	ins.	ins.	ins.	ins.
Zinci chloridum	v. s.	v. s.	v. s.	v. s.
Zinci iodidum	v. s.	v. s.	v. s.	v. s.
Zinci oxidum	ins.	ins.	ins.	ins.
Zinci phosphidum	ins.	ins.	ins.	ins.
Zinci sulphas	0.6	0.3	ins.	ins.
Zinci valerianas	100	. .	40	. .

NATURAL DISTRIBUTION OF REMEDIES.
INORGANIC MATERIA MEDICA.

ALKALIES AND ALKALINE EARTHS.

Ammonium.	Cerium.	Potassium.
Barium.	Lithium.	Sodium.
Calcium.	Manganese.	

METALS.

Aluminum.	Gold.	Nickel.
Antimony.	Iron.	Phosphorus.
Arsenic.	Lead.	Silver.
Bismuth.	Manganese.	Zinc.
Copper.	Mercury.	

NON-METALS.

Bromine.	Halogens.	Charcoal.	Peroxide of hydrogen
Chlorine.		Oxygen.	Sulphur.
Fluorine		Ozone.	
Iodine.			

ACIDS.

Organic.

Acetic.	Gallic (pyrogallic).	Oleic.
Benzoic.	Hydrocyanic.	Salicylic.
Carbolic.	Lactic.	Tannic.
Citric.	Meconic.	Tartaric.

Inorganic.

Boric.	Nitric (oxalic).	Phosphoric.
Chromic.	Nitrohydrochloric.	Sulphuric.
Hydrochloric.	Nitrous.	Sulphurous.
Hydrobromic.		

CARBON COMPOUNDS.

Acetanilid.	Ethyl iodide.	Nitrous ether.
Acetic ether	Ethylate of sodium.	Nitrous oxide.
Alcohol.	Ethidene bichloride.	Paraldehyde.
Amyl Nitrate.	Fuchsin.	Petrolatum.
Antipyrin.	Hydrocyanic acid.	Phenacetin.
Carbolic Acid.	Iodoform.	Pyrodin.
Chinolin.	Iodol.	Resorcin.
Chloral hydrate.	Kairin.	Salol.
Chloroform.	Methylene bichloride.	Thallin.
Croton Chloral.	Naphthol, Naphthalin.	Trymethylamine.
Ether.	Nitroglycerin.	Ural (Uralium).
Ethyl bromide.		Urethran.

ORGANIC MATERIA MEDICA.

Composed of the VEGETABLE KINGDOM, which includes plants used for medicinal purposes, and the ANIMAL KINGDOM, as follows:

Cantharides.	Honey and Wax.	Pancreatin.
Castor.	Ichthyol.	Pepsin.
Cochineal.	Isinglass.	Soap.
Cod Liver Oil.	Lanolin.	Spermaceti.
Albumen and Yolk of Egg.	Lard.	Suet.
	The Leech.	Sugar of Milk.
Formic acid.	Milk.	
	Musk.	

CLASSIFICATION OF MEDICINAL SUBSTANCES.

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

1. NEUROTICS, or those which have a special action on and modify the functions of the nervous system. To this group belong:
   - Hypnotics and Narcotics,
   - Anæsthetics,
   - Antispasmodics,
   - Tonics,
   - Astringents,
   - Stimulants,
   - Sedatives,
   - Spinants.
2. ECCRITICS, or those which have a special action on the secretions To this group belong:
   - Emetics,
   - Cathartics,
   - Diaphoretics
   - Diuretics,
   - Blennorrhetics,
   - Emmenagogues.
3. HEMETICS, or those which modify the blood. To this group belong:
   - Hematinics,
   - Alteratives,
   - Antacids.
4. TOPICAL REMEDIES. To this group belong:
   - Irritants,
   - Demulcents,
   - Antiseptics,
   - Disinfectants,
   - Coloring Agents,
   - Anthelmintics.

DEFINITIONS OF THE VARIOUS CLASSES OF REMEDIAL AGENTS.

HYPNOTICS AND NARCOTICS.

Hypnotics and narcotics are medicinal substances which affect the cerebral and spinal functions by impairing or destroying nervous action, having first a stimulant effect, to which the irthera-

peutic efficacy is in a great degree due. They allay cerebral or spinal irritability, relieve muscular spasm and also pain, and induce sleep. When administered to relieve pain, they are termed *anodynes;* to induce sleep, they are termed *hypnotics* or *soporifics.*

Narcotics fulfill two indications, namely: Exciting and depressing the nervous energy. For the first it is necessary to begin with small doses and repeat them frequently; for the second, a full dose must be given and not repeated for a considerable time. On account of the system becoming very soon habituated to the action of narcotics, when it is necessary to resort to their use for any length of time the amount must be constantly increased, in order to maintain the same impression. The difference between the susceptibility to their action when the body is in a morbid or healthy condition should not be overlooked. Hypnotics diminish the cerebral circulation by modifying vascular activity.

Under narcotics and hypnotics are classed such agents as *opium* and its different preparations, chloral, lactucarium, belladonna, stramonium, hyoscyamus, tobacco, lobelia, conium, aconite, cannabis indica, humulus, camphor, hydrocyanic acid, alcohol, chloroform, digitalis, ether, paraldehyde, potassium bromide, sulphonal, urethran, zinc bromide, etc., etc.

ANÆSTHETICS.

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

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

Local anæsthetics are agents whose action is limited to a cer-

tain part or organ, when topically applied paralyzing the nerves of the part, and temporarily destroying the sensibility. Included in this class are such agents as absolute ether, rhigolene, aconite, pyrethrum, atropine, cocaine, novocaine, nervocidine, chloretone, dentalone, ethyl chloride, etc., etc.

ANTISPASMODICS.

Antispasmodics are medicinal agents which allay irregular muscular contraction or spasm, and compose the irregular actions of the nervous system, without any special or decided effect on the brain. They are employed in many varieties of mental disturbance, insanity, wakefulness, hypochondriasis, convulsions from teething, spasms from general debility, in which latter case an aromatic stimulant of the circulation and a permanent tonic prove beneficial. In hysteria, dependent upon idiopathic or primary nervous irritation, the use of antispasmodics is indicated. Included in this class are such agents as asafetida, musk, camphor, valerian, galbanum, ammoniac, castor, compound spirit of ether (Hoffman's anodyne), alcohol, belladonna, chloroform, potassium bromid, valerian, etc.

TONICS.

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

Certain agents of this class, when administered in large doses, act as antiperiodics in intermittent diseases. Benefit also results in the use of tonics by alternating them. They are divided into *vegetable* and *mineral* tonics, the former possessing a bitter extractive principle, and the latter uniting astringent with tonic properties, and, in the case of preparations of iron, increasing the red coloring matter of the blood. Such agents as gentian, quassia, calumba, wild cherry, serpentaria, cinchona and its

alkaloid quinine, salix, pepsin, belladonna, digitalis, ergot, strychnine are examples of vegetable tonics; and the preparations of iron, preparations of copper, preparations of zinc, and such agents as subnitrate of bismuth, sulphuric, nitric, muriatic and oxalic acids, are examples of the mineral tonics.

ASTRINGENTS.

Astringents are medicinal agents which produce contraction of the tissues, having a corrugating power, either directly exerted on a part, or extended by sympathetic action, and thus removing morbid affections arising from a state of relaxation, such as inflammation of superficial parts, hemorrhage and excessive discharges from mucous membranes. This class of remedies is important in dental practice, owing to their great efficacy as antiphlogistics. Astringents are divided into *vegetable* and *mineral*, the former owing their peculiar property of astringency to the presence of tannic acid, while the latter possess a more decided astringency, and exert a sedative action on the vascular system. In the treatment of affections of the mucous membrane, such as *stomatitis*, the object is to arrest the inflammatory action, which is accomplished by the power of the astringent remedies employed locally to increase the tonicity of the tissue, and to diminish the calibre of the vessels supplying the part with blood, thus diminishing the quantity required for the production of the morbid action. Besides diminishing the current of the blood to the inflamed part, astringents also exert an influence on the pores or ducts through which the discharge is poured out, by diminishing their calibre. Astringents also exert an influence on morbidly relaxed tissues, when such a condition results as the sequelæ of disease, especially in lymphatic temperaments, where flabbiness of the soft tissues is characteristic.

Care, however, is necessary in the use of astringents, for when long or immoderately used they may act as direct irritants, inducing inflammation followed by ulceration and sloughing. They are contraindicated for the arrest of evacuations that are designated by nature to relieve a plethoric state of the system, unless such evacuations exist to an alarming extent. This class of remedies can be readily detected by the taste, as they convey a

sense of roughness to the palate which cannot be mistaken, and which is more marked in some substances than in others. Such agents as tannic acid, gallic acid, nutgall, matico, kino, catechu, rhatany, white oak bark, creasote, salicylic acid are examples of the vegetable astringents; while the preparations of iron and lead, alum, sulphuric and nitric acids are examples of the mineral astringents. (See *Styptics*.)

STIMULANTS.

Stimulants, also known as *excitants* and *hypersthenics*, are medicinal substances capable of exciting a temporary and rapid exaltation of the organic actions, the excitation thus produced being extended or not to the rest of the system. Although the stomach is the organ generally selected in medical practice to be the first impressed by stimulants, on account of the extensive sympathy which exists between it and the rest of the system, in dental practice these agents are topically applied to the mucous membrane of the mouth as counter-irritants and vesicants. The influence of stimulants is most apparent in conditions of morbid depression, whereas in health they soon induce depression. They possess the power of arousing the energies of the nervous system, and hence are beneficial in many nervous disorders, especially those of a spasmodic nature. When applied to the gastro-intestianl canal they promote digestion as *stomachics*, and when administered to dispel flatulence they are known as *carminatives*. When internally administered, it is for the most part advisable to begin with small doses, and increase them as circumstances may require. In some cases, however, it is necessary to give them freely from the first. It is often requisite to change the stimulating substance and also the part of the body to which it is applied; when the stomach fails, the rectum and skin may be acted upon beneficially. Topically applied, stimulants irritate and inflame the parts with which they come in contact, and are then known as *irritants*.

The most powerful and rapid stimulants are known as *diffusible*, while others of a vegetable nature, containing a volatile oil, are termed *aromatic*. Among the class of diffusible stimulants are such agents as alcohol, preparations of ammonia, arnica,

phosphorus, etc., etc. Among the class of aromatic stimulants are capsicum, cinnamon, black pepper, mace, cloves, pimento, oil of turpentine, ginger, cardamom, calamus, gaultheria, peppermint, origanum, etc., etc.

SEDATIVES.

Sedatives are medicinal substances employed to diminish the frequency of the action of the circulation, their therapeutic influence being due, it is thought, to a stimulant character. They reduce vascular excitement, and while relieving irritability and irregularity of the heart's action, their first effect is to restore its tone and force when it is in a morbidly depressed condition. Substances known as *refrigerants*, which possess the power of diminishing febrile heat, allaying thirst, restoring the secretions, and which comprise almost all of the neutral alkaline salts, are also included with sedatives. Among the class known as sedatives are digitalis, American hellebore (veratrum viride), white hellebore (veratrum album), yellow jasmine (gelsemium), tartar emetic, nitrate of potassium, etc., etc. Among the class known as refrigerants are borate of soda, citrate of potassium, acetate of ammonia, spirit nitrous ether, and vegetable acids.

SPINANTS.

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

EMETICS.

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

While the action of an emetic is local as regards the stomach,

it extends to almost every organ of the body, and in order that a substance of this kind shall produce its effect upon the stomach, it must first make an impression upon the cerebro-spinal axis. Within fifteen or twenty minutes after an emetic is administered there is experienced a feeling of distress, relaxation and faintness, with a cool, moist skin and small, feeble and irregular pulse, such symptoms increasing until emesis occurs; during which the face becomes flushed, the pulse full and frequent, with an increase in the temperature of the body. When the action of vomiting is over, the skin again becomes moist, the pulse soft and feeble, and a languid and drowsy feeling is experienced. Whatever may be the apparent necessity for evacuating the stomach, all the circumstances of the case must be considered, and, especially if there be much arterial excitement, with determination to the head, blood-letting should sometimes be premised.

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

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

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

Emetics, by frequent use, are prone to cause an increased sus-

ceptibility of the stomach to their action; hence, persons of delicate habits should use them cautiously.

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

To relieve excessive vomiting, resulting from the use of emetics, ice broken in small pieces and swallowed; lime water and milk (a teaspoonful of each, mixed cold and given at intervals of 15 or 20 minutes); a drop of creasote in a wineglass of water (a tablespoonful given every 15 or 20 minutes); 1/2 drop of diluted hydrocyanic acid in syrup and water, or in syrup of wild cherry bark (given every 15 minutes); or infusion of camphor (made with boiling water and given cold, a teaspoonful frequently repeated); brandy and water; clove or green tea; an anodyne injection; counter-irritant to the stomach (as a mustard plaster, a hot fomentation of brandy and clove or spice plaster).

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

CATHARTICS.

Cathartics or purgatives are medicinal agents which evacuate the bowels, and are capable of fulfilling three different indications: 1. Simply to evacuate the bowels. 2. To excite an increased discharge from the mucous coat of the intestines, and 3. To stimulate the neighboring viscera and cause them to secrete a greater quantity of their peculiar fluids. When they produce watery discharges by stimulating the mucous follicles and exhalants, they are termed *hydragogues*. When given in overdoses they are so powerful as to produce violent vomiting and purging, pain in the abdomen, cold extremities and a sinking pulse. Several different cathartics are usually combined in one formula, when it is desired to produce all of the indications above referred to. Some agents of this class produce their effect by absorbing

the acid generated in the alimentary canal, thus becoming converted into a purgative salt, as magnesia, for example. Others expend their principal force upon the rectum and large intestines, and for this reason are advantageously employed in affections of the lower bowels, and the uterus and its appendages, such as aloes, for example. Cathartics should always be given on an empty stomach. If administered immediately after a full meal, they arrest the digestive process, are liable to cause nausea, if not vomiting, and do not evacuate the bowels with the same certainty or effect.

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

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

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

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

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

lining of the intestines, and augment the peristaltic action to a great degree. Drastics are the more powerful and violent cathartics, and produce a greater degree of irritation in the lining membranes of the intestines, and occasionally act upon the nerves of the stomach, so as to cause nausea and sometimes vomiting. Drastics generally belong to the resino-extractive substances, and act violently, on account of being sparingly soluble and adhering to the mucous coat of the intestines.

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

DIAPHORETICS.

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

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

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

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

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

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

Stimulating diaphoretics are employed in rheumatic and pulmonary affections, after vascular excitement has been reduced, and where the surface is cool, being contraindicated in a high degree of inflammation. For such effects, the difusible stimulants, aromatic substances, and such narcotics as opium and camphor are administered. During the administration of diaphoretics, the patient should be confined to bed, and when diaphoresis is

excited, it should not be suddenly checked. Venesection is generally resorted to when there is great arterial excitement with undue heat of skin before the attempt is made to administer diaphoretics.

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

DIURETICS.

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

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

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

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

BLENNORRHETICS.

Blennorrhetics are medical substances which increase the secretion of the mucous membranes, and are employed in morbid conditions of such membranes, in order to restore them to healthy action, in cases where their secretion is deficient, excessive or abnormal in quality. They are termed *expectorants* when used to stimulate the secretion of mucus from the bronchial or laryngeal membranes, as in bronchitis and laryngitis, and during convalescence, in pneumonia. The oleo-resinous agents of this

class are employed in chronic diarrhœa, and the diarrhœa of typhoid fever, such as oil of turpentine, for example; also in diseases of the urino-genital mucous membranes, such as gonorrhea, gleet, leucorrhea, incontinence of urine, cystitis, etc., etc. Included in the class of blennorrhetics are such agents as senna, cimicifuga, garlic, turpentine, squill, copaiba, cubebs, matico, buchu, myrrh, benzoin, storax, balsam of peru, balsam of tolu, etc., etc.

EMMENAGOGUES.

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

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

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

HEMATINICS.

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

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

ALTERATIVES.

Alteratives are medicinal substances which are capable, when administered in small doses, of removing morbid structures and

conditions, without any sensible evacuation; in other words, changing, in some inexplicable and insensible manner, certain morbid actions of the system.

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

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

ANTACIDS.

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

The alkalies, alkaline earths, and their carbonates are the substances included in this class, and the former are more energetic in their action than the alkaline earths, such as magnesia. The

carbonates of these earths have little or no chemical influence upon the tissues.

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

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

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

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

IRRITANTS.

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

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

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

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

EPISPASTICS, also called *vesicants* and *blisters*, are medicinal agents, capable of producing, when applied to the skin, inflammation followed by an effusion of serum beneath the cuticle. As a general rule, blisters should remain on the surface of the skin six or eight hours, in order to insure their full effect. When the skin is very delicate a shorter application will answer every purpose; and in the case of children it is seldom necessary for them to remain longer than three or four hours. When applied to the scalp, twelve hours are generally required. After removing a blister, the usual dressing is some non-irritating ointment, such as simple cerate. In acute diseases, blistering ought never to precede such means as have a tendency to reduce inflammatory action, and the application should be as near the affected part as possible.

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

If a blister is applied long enough to redden the skin, a simple poultice will complete the vesication; and in the case of children this method should always be pursued. When it is necessary to keep the blister open, weak epispastic or savin ointment will prove sufficient. When the circulation is languid in the ex-

tremities, they seldom act efficiently, and may cause gangrene by exhausting what vitality remains. When strangury is produced, the blister must be removed after three or four hours, and the part bathed with olive oil, or a poultice applied, and diluent drinks used; an opium suppository or injection will prove serviceable. Epispastics are employed as local stimulants in the treatment of inflammations; to create a healthy inflammatory action, as in various cutaneous eruptions; to relieve pain; to destroy morbid associations by causing a powerful impression; to stimulate the absorbing or secreting vessels of parts in the neighborhood of the affected part; to stimulate generally; to relieve threatened gangrene and paralysis; to produce local depletion as evacuants, and to prepare a surface for the endermic application of medicines.

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

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

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

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

Iron or silver wire in the form of points and loops, heated to a white heat and the *moxa* (cones or cylinders of inflammable substance) represent the actual cautery; and caustic potash, nitrate of silver, burnt alum, chloride of zinc, chromic, sulphuric and nitric acids, and the nerve or arsenical paste employed in dental practice, represent the potential cautery

The Thermo Cautery is an appliance by means of which a platinum point is heated to a white heat by the burning of gasoline vapor; it is employed to destroy tissue. Paquelin's thermo cautery is the form generally used for removing small tumors, to arrest hemorrhage, and destroy exuberant growths.

The Galvano Cautery is a small battery which furnishes a high degree of heat by which platinum loops cut, sear, and snare tissues and arrest hemorrhage. By previously obtunding the part with a local anæsthetic, the pain is greatly relieved.

A sub-class is composed of what are known as ISSUES and SETONS; the *blister issue*, where the skin is removed by a blister, and the discharge promoted by means of stimulating applications, as the cantharidal ointment, for example; also, the *pea issue*, where an incision made by the lancet is kept open by means of a pea, beet, or piece of orris root. The *Seton* is prepared as follows: A Seton needle, to which is attached a skein of silk, is passed completely through the part chosen for the operation, after which it is removed, and the ends of the silk left hanging from the wound. It is dressed once, or several times a day, with some mild ointment; or, if this is not sufficient to keep up the discharge, a more stimulating ointment is used. Escharotics are employed to destroy morbid growths, warts, polypi, condylomata, fungous granulations, etc.; also to relieve violent inflammation by their substitutive action; to stimulate indolent ulcers, sinuses, etc.; to open abscesses of the liver, and other internal viscera, the method of "aspiration" being preferred; to remove cancer, lupus and other morbid growths; to decompose the virus of rabid and venomous animals, and of chancres and malignant pustules, and prevent their absorption.

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

DEMULCENTS.

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

Demulcents are employed externally in the form known as *Emollients*, to relieve the heat, swelling and pain of inflammation, wounds and burns; to hasten suppuration, as detergents, to cleanse foul ulcers, and to promote suppuration from granulating surfaces. Mixed with water in the form of soft masses, they are commonly termed *cataplasms* or *poultices*, and have the effect of softening the parts to which they are applied as vehicles of heat and moisture. Included in the class of demulcents are such substances as gum arabic, flax seed, tragacanth, slippery-elm bark, sassafras pith, marsh mallow, benne, quince seed, liquorice root, Iceland moss, Irish moss, starch, arrow root, tapioca, sago, barley, glycerin, pyroxylon, collodion, solution of gutta percha, honey, animal fats, such as lard, in the form of cerate (lard 2 parts and white wax 1 part), and suet, both containing stearine.

ANTHELMINTICS.

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

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

COLORING AGENTS.

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

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

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

ABSORBENTS.

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

ANODYNES OR ANALGESICS.

Anodynes, which with *sedatives*, *hypnotics*, or *soporifics*, are included in the group of narcotics, are medicinal agents capable of alleviating pain by lessening the sensibility of the nerve-centres or the peripheral extremities. When applied locally they are called *analgesics*. Included in this class are opium, morphia, chloroform, sulphuric ether, aconite, croton, chloral, belladonna, camphor, gelsemium, cannabis indica, stramonium, hyoscyamus, carbolic acid, atropine, creasote, cocaine, eugenol, iodoform, iodol, antipyrin, blood-letting, heat and cold, acupuncture, etc., etc.

ANTEMETICS.

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

ANTHRIDROTICS.

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

ANTIPERIODICS.

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

ANTIPYRETICS.

Antipyretics are medicinal agents having a decided power to depress the temperature of the body during fever, and control hyperpyrexia. Included in this class are antifebrin, antipyrin, quinoline or chinoline, thalline, kairine, camphor, eucalyptol, hydroquinon, pyrodin, resorcin, quinine, salicine, thymol, salol, etc.

ANTISEPTICS.

Antiseptics are medicinal agents capable of arresting fermentative processes, preventing the development of bacteria, thereby preventing or arresting the decomposition of organic substances, and the process of putrefaction. When these agents are brought in contact with disease germs they destroy their vitality. Included in this class are carbolic acid, creasote, salicylic acid, eucalyptus oil, iodoform, benzoic acid, boracic acid, pepsin, bromine, iodol, hydronapthol, peroxide of hydrogen, pyrozone, aristol, bichloride of mercury, essential oils, guaiacol, alcohol, tincture of myrrh, tincture benzoin, salicylic acid, salicylates of sodium, salol; the volatile oils are oil of cinnamon, oil of cassia, oil of eucalyptus, oil of cloves, oil of cajeput, oil of thyme, oil of peppermint, oil of turpentine, oil of mustard, etc.

Forms of Antiseptics for Use: Dr. Black on this subject says: "In regard to the use of antiseptics in different cases and for different purposes, I should divide them into three forms, each of which has especial advantages.

"These forms are: the solution in water, the oil, and the powder.

"The solution in water is especially useful for cleaning infected surfaces of wounds, washing abscesses, and, indeed, in any case where there is something that can be removed by washing. In the performance of this act the antiseptic is diffused to all parts of the wound or abscess mechanically to the best advantage. It is more likely to reach every part in this form than in any other; and this is an advantage that can hardly be overestimated; for it is very difficult to reach all parts of an abscess by any mode of procedure now known to us on account of the very tardy diffusion of liquids. And in case the liquid containing the antiseptic in solution does diffuse, its very diffusion and

mixture with the surrounding fluids soon dilutes it below its range of antiseptic value. It is therefore necessary that the washing be continuous to obtain the continuous effect of the drug. This is generally impracticable, and for this reason the watery form of antiseptics is very much limited in usefulness. The continuous drip, or the application as often as every fifteen or twenty minutes, gives effective results in some favored localities; but it is very difficult to carry out and occasions much trouble. The continuous bath is still more limited in its range of application. Neither of these can be used in dental practice. With us the watery form of antiseptics should be limited to the cleaning of infected parts. They cannot be trusted to prevent septic action for any length of time, for the reason that they so soon become diluted below their range of antiseptic value by mixing with the secretions, or the juices of the flesh. Since studying the powers of antiseptics and disinfectants more closely, my feeling is that it will not do for us to expect to do too much disinfectant work in connection with the soft tissues except in cases in which some tissue destruction can be borne; and that antiseptics only retard the growth of microbes during their presence in effective proportion; hence the necessity for continuous and oft repeated application. In using these for the purpose of cleaning, much aid may be had by making use of the solution in peroxide of hydrogen instead of water, so as to obtain the mechanical effect of the ebullition of the oxygen evolved in mixing the antiseptic with the secretions. There is possibly some antiseptic virtue in oxygen itself as well; but I am apt to think that its principal use is the mechanical one. And that is a very important use. Thorough cleaning is excellent antiseptic work, and the peroxide of hydrogen will do this in many positions where nothing else will, and at the same time carry the antiseptic proper to the more remote parts of the wound or abscess."

Sir Joseph Lister is the originator of the antiseptic treatment in surgery. He first employed carbolic acid as an antiseptic for surgical dressings, but abandoned it on account of its slow action as a germicide and its volatility. He then employed bichloride of mercury, which was stable and acted promptly, but caused irritation, and was precipitated by the albumen contained in the serum of the blood. He then employed the sero-sublimate

gauze, consisting of gauze saturated with a solution of bichloride of mercury, in the serum of the blood; but this being harsh and non-absorbent he substituted for it a combination of chloride of ammonia and chloride of mercury, known as sal-alembroth, which was not only less irritating, but was soluble in blood serum. Later he presented the double cyanide of zinc and mercury as the best antiseptic, on account of its being non-volatile, unirritating, insoluble in water, and only soluble in 3,000 parts of blood serum, with an inhibitory power so high that a solution of 1 : 1200 is sufficient to keep animal fluids permanently free from putrefaction. The Listerian method consists in applying over the line of the wound six or eight layers of the gauze, out of which the bichloride has been washed by wringing it out once or twice in a solution of 1 to 20 carbolic acid. All zymotic diseases are at the present time generally attributed to bacteria or to their ptomaines, and for a number of years the theory that all contagious and epidemic diseases are caused by micro-organisms has been received by the medical profession. Many diseases are now regarded as contagious which were not so considered before the discovery of bacteria. Bacteria are found in great numbers and different varieties in the air, earth, water, and in every part of the body of man and animals, and multiply very rapidly by division and by spores. Some varieties are subject to change, others appear to be permanent. New varieties are supposed to be produced by the same laws by which the different kinds of vegetables, plants and animals are generated. The discoveries in bacteriology have brought about a revolution in the treatment of many diseases, namely, tuberculosis—as the Koch treatment—typhoid and other fevers, carbuncle, erysipelas, diphtheria, pneumonia, influenza, malaria, tetanus, etc., etc. (See *Use of Antiseptics in Dental Practice.*)

AROMATIC BITTERS.

Aromatic bitters differ from simple bitters in the aromatic constituents they contain. They possess tonic properties and invigorate digestion and promote constructive metamorphosis. They are employed in the same cases as simple bitters, but appear to possess some specific properties due to the aromatic constituents. Included in this class are serpentaria, prunus virginiana, canella, anthemis, etc.

CARMINATIVES.

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

CAUSTICS.

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

CAUTERANTS (*See Irritants*).

CONSTRINGENTS (*See Astringents*).

COUNTER-IRRITANTS.

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

DESICCATIVES.

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

BLEACHING AGENTS.

Bleaching agents are of three classes: those which furnish free chlorine, nascent oxygen, and those that have an affinity for oxygen and known as reducing agents. These agents, employed for bleaching discolored teeth, are represented by the following combinations: hydrogen dioxide, sodium dioxide, acetozone, sulphurous acid, sulphur dioxide, pyrozone, potassium permanganate, etc., etc.

DETERGENTS.

Detergents are medicinal agents capable of cleansing ulcers, suppurating wounds, etc., by acting as either stimulants or

emollients. Included in this class are such agents as borax, burnt alum, slippery-elm bark, acacia, flaxseed, tragacanth, etc.

DEODORIZERS.

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

DILUENTS.

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

DISCUTIENTS.

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

DISINFECTANTS.

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

EMOLLIENTS.

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

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

ERRHINES.

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

ESCHAROTICS.

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

EXPECTORANTS.

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

EVACUANTS.

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

EXCITANTS.

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

FEBRIFUGES OR ANTIPYRETICS.

Febrifuges are medicinal agents capable of diminishing the heat and allaying the thirst of fevers, and are generally recognized as *Refrigerants.* Included in this class are nitrate of potassa,

chlorate of potassa, the mineral acids, spirits of nitrous ether. antipyrin, chinoline, salicin, etc., etc.

GERMICIDES.

Germicides include all substances which destroy any form of microbe or disease germs, such as bacteria, which are inimical to life. Included in this class are bichloride of mercury, peroxide of hydrogen, iodoform, iodol, iodine, salicylic acid, eucalyptus, carbolic acid, chlorine, chloride of zinc, permanganate of potash, naphthol, etc.; also heat. All germicides are antiseptics, but all antiseptics are not germicides.

HEMOSTATICS.

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

HYPERSTHENICS.

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

HYPNOTICS.

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

LAXATIVES.

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

NERVINES.

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

NUTRITIVES.

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

PURGATIVES.

Purgatives are active cathartics, and are divided into several classes, according to the nature of their action, such as: *Laxatives*, which incite intestinal movements without much increase of the intestinal secretions. Included in this class are manna, sulphur, magnesia, castor oil, etc. *Saline Purgatives*, which produce increased secretion, and at the same time hasten the peristaltic action, the stools being loose and watery. Included in this class are sulphate of magnesia, phosphate of soda, tartrate of potassium and sodium, Seidlitz powder, bitartrate of potassium, etc. *Mercurial Purgatives*, principally calomel and blue mass, which are supposed to produce cholagogue effects, and also an influence peculiar to themselves. *Tonic astringent* and *resin-bearing purgatives*, which have an influence over the liver and the glandular appendages, and promote the tonicity of the muscular layer of the intestines. Included in this class are senna, rhubarb, aloes, jalap, scammony, colocynth, podophyllum, etc. *Hydragogue purgatives*, which are very energetic in their action, increase the glandular secretions and cause an abundant outward diffusion to such a degree as to produce very watery stools; and also excite rapid and severe peristaltic movements. Included in this class are gambogia, croton-oil, elaterium, etc. (See *Cathartics.*)

REFRIGERANTS.

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

RESOLVENTS.

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

RESTORATIVES.

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

SIALAGOGUES.

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

STYPTICS.

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

By contraction of the blood vessels internally: digitalis and ergot; also for checking excessive discharges: acetate of lead-carbonate of lead, subacetate of lead, lime water, the application of cold, as ice, and of heat, as hot water, etc.

VESICANTS.

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

FORMS IN WHICH MEDICINAL SUBSTANCES ARE EMPLOYED.

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

AQUA.—A medicinal water made by dissolving a volatile substance in water.

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

CAPSULES for short tubes made of glycerin, and are agreeable forms for administering medicines which are unpleasant to the taste.

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

CERATE.—A preparation with a fatty base.

CHARTA.—A medicated paper.

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

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

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

ELIXIR.—A spirituous liquid, either aromatic or sweetened, and containing some medicinal substance

DENTIFRICES are antiseptic and alkaline mixtures, in the form of powders and pastes, for cleaning the teeth.

EMPLASTRIUM.—A plaster for topical application for sedative or irritating medicines.

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

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

EXTRACTS are preparations obtained by the evaporation of a vegetable solution, in the form of juices, infusions or decoctions, to a more or less fluid consistence; the strength of fluid extracts is 100 per cent. and they contain the active principles of drugs, being of a uniform definite strength and never deteriorating.

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

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

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

GLYCERITES are combinations of medicinal substances with glycerin.

GLYCEROLS are combinations made by dissolving medicinal agents in glycerin.

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

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

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

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

LIQUOR.—An aqueous solution of non-volatile substances.

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

MASS.—A combination of substances to be made into pills.

MOUTH-WASHES are liquid preparations, antiseptic in character, and also containing either astringents, sedatives or refrigerants, according to the condition of the mouth to be corrected.

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

MUCILAGES are solutions of colloid substances, such as acacia, in water.

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

OLEATES are medicinal ointments; a solution of drugs in oleic acid. (See Medicinal Oleates.)

OLEORESIN.—A fluid mixture of oil and resin extracted by percolation with ether, being an ethereal extract.

OLEUM.—An oil; a compound of fatty acid with glycerin; distilled, volatile and essential oils are obtained from drugs by distillation and not being saponifiable are not true oils; the volatile oils are the essential oils of the plants from which they are obtained by distillation, and a number of them by such a process from spices.

PILLS are simple or compound medicinal agents, of a firm consistence, spherical or globular in shape, and generally not exceeding five or six grains in weight; in such a form and especially when sugar-coated, the unpleasant taste of a medicine is overcome and also, when desired, a slow absorption of the drug is secured.

PLASTERS are preparations of a solid glutinous composition, which, at the ordinary temperature of the body, adheres to the part on which it is placed.

POWDERS are dry substances in minute subdivision.

POULTICES are preparations for applying continuous heat and moisture and softening the tissues. Their effects are to cause an afflux of blood to the part, dilate the vessels and soften the tissues by the influence of both heat and moisture, and render the

diffusion of the fluids easy. In inflammatory conditions, the stasis of the vessels implicated is relieved, the tension of the parts lessened and resolution brought about. Where the stage of exudation is present, these preparations promote the increase and migration of the white corpuscle and facilitate the escape of purulent matter. Poultices also relieve the pain of inflamed parts by relaxing the tissues, and thereby removing pressure from the sensory nerve filaments; they relieve pain in parts distant from the points where their applications are made, and have both a local and systematic effect. Poultices are generally composed of such substances as flaxseed meal, powdered slipperyelm bark and corn meal; also bread and milk are sometimes employed.

The substance dissolved in hot water is spread upon soft muslin of such a size as to allow one free end to fold over the mass and intervene between it and the surface of the skin; or it may be inclosed in a small bag of muslin. Glycerin spread over the surface of a poultice will prevent its drying. Laudanum is often added to mitigate the pain, if necessary; also charcoal in the form of powder. A yeast poultice is made of brewer's yeast with enough of flaxseed to give it a proper consistence. Poultices should not be allowed to remain too long, as their effect will cause the skin to become white, wrinkled and pulpy, and lead to the formation of small boils or abscesses; also, in case of wounded or ulcerated surfaces, their too long use will cause the granulations to become pale and flabby and prevent healing; besides, if the granulations are large, they lower the tone and vigor of the system, depress the circulation, and exhaust the irritability of the vaso-motor nerves, and thus prevent healing. Poultices are employed in boils, carbuncles, irritable ulcers, gangrenous sloughs. The charcoal and yeast poultices are used in foul wounds. Poultices are also applied with benefit in pneumonia, pleuritis, pericarditis, hepatitis, peritonitis, faucial inflammation, etc.

A Resin.—Resina is a solid substance composed of resinous substances. Resins are insoluble in water, but soluble in alcohol, ether, chloroform and oils. Gum resins contain gum and resin. Balsamic resins contain benzoic or cinnamic acid.

Spirits are alcoholic solutions of volatile substances, or oils in rectified spirit.

STEAROPTENES are the solid constituents of volatile oils.

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

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

TABLETS are small flat preparations made from drugs and sugar of milk, which have been minutely subdivided, admixed, and compressed.

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

TROCHE or TABLET.—One or more drugs combined with sugar and mucilage in the form of solid tablets. A hypodermic tablet should be readily soluble in water, and usually consists of a single medicine. The compressed tablet is generally composed of a pure drug, capable of being pressed into a tablet form without the addition of mucilage or other adhesive substance.

UNGUENTUM OR OINTMENT is a fatty semisolid mixture of a low melting point, employed to soften, protect and medicate the skin as a topical application.

WINE.—A medicated wine; generally white wine in the form of a medicinal solution.

INFLAMMATION:

WITH SPECIAL REFERENCE TO THE ORAL MUCOUS MEMBRANE.

Definition of Conditions Associated with Disturbances of Nutrition.—Hyperemia signifies superabundance of blood in the blood vessels, but this term is restricted to such a condition existing in a definite organ or portion of an organ; hence hyperemia and dilatation of blood vessels are so intimately connected that the one cannot exist without the other.

It is also necessary that the capillaries as well as the arteries and veins should be injected, in order that the color of the region

so affected should be increased, as the former constitute a dense network, which traverses the entire organ, while the latter only form single branches which occupy limited spaces. There are two forms of hyperemia, *active* and *passive;* in the active form there is an increased quantity of arterial blood passing into the part, while in the passive form a partial or complete stagnation of the blood through the vessels occurs.

The term *Plethora*, as distinguished from hyperemia, signifies a superabundance of blood in the entire circulatory system—an increased amount of blood in all the vessels of the body. Active hyperemia in the skin and mucous membranes is characterized by a diffuse bright-red coloration, the parts so affected having a higher temperature than those around them. The diffuse coloration is caused by the bright-red arterial blood which fills the capillaries; and the elevation of the temperature is due to the presence of the blood, which heats the skin or mucous membranes, and the more quickly the blood circulates the warmer the tissues become, until at length the highest degree of blood heat is accomplished.

Passive hyperemia denotes a condition of the tissues characterized by a diffuse venous, not arterial, coloration and a relatively low temperature. In passive hyperemia the capillaries are also dilated, but the blood-current through them is retarded; hence the tissues so affected are of a venous color instead of the bright-red or arterial color of active hyperemia.

The term *Anemia* signifies a condition in which there is an abnormal diminution in the amount of blood, and is the opposite to that of Plethora, being characterized by a pale face, lips, gums and mucous membranes. But the normal amount of blood may be present, and yet the characteristic paleness denote an anemic condition, for the reason that the number of red blood corpuscles are decreased and replaced by white blood corpuscles, or by blood plasma.

Again, the paleness of an anemic condition may be due to a deficiency of the red coloring matter of the red blood corpuscles. A permanent contraction of the blood vessels may also cause a paleness of the face, lips, gums and mucous membranes.

The term *Ischemia* is also employed to denote local poverty of the blood, a deficiency of the coloring matter (hemoglobin).

The direct cause of hyperemia, and also of ischemia, is a change of calibre of the blood vessels, namely, dilatation and contraction. This dilatation and contraction of the blood vessels are due to the elastic and contractile elements of the sheaths and walls of the arteries and veins, and both the dilatation and contraction are regulated by the spinal cord, through the medium of the vaso-motor nerves. It is a common opinion that hyperemia cannot exist without the influence of the vaso-motor nerves.

IRRITATION indicates the condition of a tissue in which there exists an excess of vital action, on account of the disordered state of the nerves of the affected part or organ. It is commonly manifested by such symptoms as increased circulation, warmth and sensibility, and functional disturbance of a greater or less degree.

What inflammation is to the vascular system, irritation is to the nervous system, and the difference between these two conditions is defined by the explanation that the latter terminates when the former begins. Irritation is generally excited by the action of certain stimuli upon organic tissues, by which the sensibility of such tissues is prevented and the circulation deranged; such pathological conditions, when they are not the precursor of inflammation, soon pass off, and the affected tissue regains its normal state when the exciting cause ceases to operate. Irritation may be direct and indirect—direct when the irritation manifests itself at the point where the impression to which it owes its origin is received; indirect when the irritation, through sympathy and reflex action, is transmitted to more or less remote parts or organs. An example of direct irritation may be adduced by friction upon the skin or mucous membrane of the mouth sufficient to cause redness in the first tissue, and increased coloration in the second; or indirect irritation, as in the convulsions attending difficult dentition, the irritation being communicated to the brain by the fifth pair of nerves, and from thence to the nerves of the voluntary muscles, the seat of the spasmodic action. Dental caries also affords another example of indirect irritation, in the form of neuralgic pains of the temple, face, ear, eye, and of even more remote parts, such as the uterus.

The effect of irritation upon the vascular system is manifested by dilatation of the blood vessels; but the immediate effect, how-

ever, of a slight chemical or mechanical irritant is not at once apparent in the capillaries, but first causes contraction of the smaller arteries, and sometimes of the veins, such contraction being followed by a dilatation, the immediate cause of which is yet obscure. It is, however, supposed to be the result of relaxation or a temporary paralysis of the walls of the vessels, a condition following contraction, and which, as a consequence, causes a decrease of their resistance to the pressure of the blood within them. The irritation either perverts the function of the nerves of the vessels, or of the lining cell substance of the capillary walls; or the disturbance is due to reflex action.

INFLAMMATION denotes an abnormal process or condition characterized by certain changes of texture, which, although uniform in type differ widely in appearance, and terminate in different results, according to the nature and permanency of the causes upon which such a condition depends, or which have given rise to it.

The *symptoms* of inflammation consist of the phenomena which accompany the textural changes characteristic of this condition, and its *pathology* the textural changes which occur during the continuance of this condition. The essential features of inflammation are an increased afflux of blood to the affected part, with a greatly increased tendency to cell proliferation and tissue formation.

The *causes* of inflammation determine in a great degree its treatment on account of the influence they exert upon its destructive tendency, and they may be classified as those arising—1st, from mechanical violence; 2d, from irritating and destructive chemical action; 3d, from poisonous infection, and the effect of injurious micro-organisms—the latter being regarded as "immediate determining causes of the more destructive phases of the inflammatory process." When inflammation owes its origin to an evident injury, or the reverse, it is termed *traumatic* or *idiopathic*, and when no apparent cause can be discovered it is termed *spontaneous*.

The causes of inflammation are divided into *predisposing* and *exciting*.

Among the more important predisposing causes are *impoverished blood*—defective in quality—such as may result from a want

of proper food and of fresh air, the effects of such deprivations being manifested in the case of a neglected child where a hard swelling occurs in the cheek, which, after a few days, presents a gangrenous condition, constituting the disease known as *cancrum oris* or *gangrænopsis*. On the other hand, an habitual excess of food and drink is also a predisposing cause of inflammation, the blood, as a consequence, being impaired, and also the tissue which it supplies. *Blood poisoning* is also another predisposing cause, resulting, it may be, from the presence of certain diseases, such as syphilis, diabetes, mellitus, eczema, etc. A local hyperemia, constituting the first stage in the development of inflammation, may result from certain poisons in the blood, which cause it to stagnate in limited areas, through an inability to stimulate the heart and blood vessels. Syphilitic ulceration of the mucous membrane of the mouth is an example of such a predisposing cause. *Weakened vitality of parts* is also a predisposing cause of inflammation and may result from habitual ill feeding, protracted illness, overwork, long exposure to extreme cold. Parts such as the mucous membrane of the mouth, which have already been the seat of inflammation, are prone to such a condition subsequently, from slight provocation.

Defective or perverted nervous supply may also be regarded as a predisposing cause of inflammation. Certain forms of skin disease, and inflammatory conditions of the mucous membrane of the mouth, furnish examples; also, of the peridental membrane of the teeth, resulting in severe periodontitis and alveolar abscess.

The *influence of climate* is also regarded as a predisposing cause, for, in tropical regions, inflammation of certain organs, often terminating in abscesses, are very prevalent. The midsummer and fall months are considered to be more favorable for surgical operations, on account of the comparative absence of inflammatory complications at such times.

Age has also some influence as a predisposing cause of inflammation. In childhood acute hyperemia is induced by comparatively slight exciting causes, as then the process of nutrition is at its greatest period of activity, and any interruption of its process is followed by derangement of health.

The effects of the irritation of the first dentition may be adduced as an example. Old age induces weakness in the tissues

and decrease of power of resistance to the exciting causes of inflammation.

Exciting Causes of Inflammation.—These causes may all be included in the condition known as irritation of the tissues, resulting from irritants of various kinds, the action of which is immediate in producing the inflammatory condition. Exciting causes may be divided into *external*, which are easily recognized, and *internal*, which are more obscure, and are assisted by some predisposition of the organism.

Cold is a frequent cause of inflammation, and its effect are due to sudden changes in the constitution of the blood from an arrest of the function of the tissues, temporary in its nature, which interferes with the emunctory action, whereby effete and irritant materials which should be eliminated are retained and poison the blood. *Heat* is also a cause of inflammation, its effects varying from a slight redness, denoting transient hyperemia, to vesication, either superficial or deep. When death of tissue results from such a cause, suppuration ensues on the separation of the eschar; and when there is a loss of cicatricial power, repair by granulation and suppuration (second intention) is prevented. The inflammation resulting from simple burns and scalds, provided no eschar is formed and air is excluded, soon subsides.

Mechanical violence excites inflammation; yet, under favorable circumstances, this condition resulting from an incised wound is soon arrested, owing to its benign form, by the particles of lacerated tissue being carried away by the blood and the subsequent liquid exudation, while those that remain undergo liquefaction and absorption by the lymphatics; hence, when the cut surfaces are brought and retained in proper apposition, speedy union, by the "*first intention*," results. Union by "first intention" is induced by such changes as cell-proliferation, the formation of new capillaries, and the generation of cicatricial tissue. It is only when the vitality of the tissue is destroyed and foreign matters left in the wound, especially a punctured one, caused by a rough or rusty instrument, that there are complications. The tissues themselves, when they lose their vitality, become irritants, even when the dead matter is very minute. A boil furnishes an example, the core of which is composed mainly

of yellow, elastic fibres with some leucocytes or pus cells in the meshes. This mass becomes dead, and while the white fibrous element liquefies and mingles with the pus, the yellow fibres remain unchanged and constitute the irritant body, to the presence of which is due the suppurative inflammation. The presence of a clot of blood in a wound may prevent union, and cause pus formation.

Chemical irritants excite inflammation by first causing increased redness, which steadily extends and becomes more intense until a considerable diameter is attained. There is also increased heat and fullness of the part affected, and an eschar forms as the result of the action of the chemical agent upon the epidermis in the case of the skin, or the corium in the case of mucous membrane, the depth of the action depending upon the nature of the chemical irritant. After one or two days the narrow circle of redness disappears, and, after one or two weeks, the eschar separates, disclosing an area of smooth cicatricial tissue. When the action of such irritants is slight, repair soon follows, without the formation of an eschar; but when their action is severe enough to devitalize the tissue, the sloughs are thrown off without suppuration, if the parts have been protected from the air or antiseptic applications have been made.

Mineral irritants, such as mercury and arsenic, for example, cause inflammation by a process different from that of chemical irritants. The inflammatory action of mercury and arsenious acid is developed only after the poison has entered the circulation, and a certain amount has been received by the stomach, when active inflammation of the mouth with salivation (mercurial stomatitis) supervenes, if the agent is mercury, or active gastric hyperemia with vomiting, if the agent is arsenic. There is a *specific* poisonous action brought about by such irritants, on account of the tissues of the mouth and stomach being more sensitive to the influence of these mineral poisons. The cause of this peculiar susceptibility is as yet obscure.

Micro-organisms are capable of exciting inflammation by direct contact with tissues, when the latter are exposed by injury.

Many of these low forms of life are indestructible by the most extreme heat and cold, and also by the strongest chemical agents. And whenever the oxygen is prevented from entering a

wound these micro-organisms generate with great rapidity, and are nourished by the fluids and granulating surfaces which surround them. The chemical and vital changes which these animal materials undergo bring about putrefaction through the agency of fermentation, and certain poisonous combinations are thus formed. These micro-organisms, therefore, acting as a poison, decompose the materials generated for repair, and thus prevent the constructive process; they also act as a putrefactive ferment, producing septic poisons destructive in their action. It has been definitely determined that these organisms, although present in every destructive inflammation, "do not occur in the blood nor in the tissues of the healthy living body of man or of the lower animals." Diminished vitality, whatever may be the cause, favors the invasion and development of micro-organisms in the form of parasites.

While some of the common parasites cause injurious effects by inciting inflammation in tissues and organs, they only act as foreign bodies, while the *microscopic fungi* and their germs, acting as invisible particles of organized matter, cause the greatest injury. If they are protected from the influence of oxygen, these micro-organisms germinate very rapidly, and derive their sustenance from the fluids of the inflamed tissue and the granulating surface. The form known as *vibrio septica* generate putrefaction in animal matter by bringing about a process of fermentation—dental caries affords an example. The chemico-vital changes accompanying the process of putrefactive fermentation give rise to *septic poisons*, which, being absorbed in the circulation, result in *septicemia* and *pyemia*. Dr. Koch affirms that "bacteria do not occur in the blood nor in the tissues of the healthy living body, either of man or of the lower animals," and the same investigator also says: "When introduced by inoculation into animal tissues, they multiply and excrete soluble substances, which get into the surrounding tissues by diffusion."

The tissues, by the contact of the micrococci, lose their vitality, and the parasite growth multiplies and spreads rapidly in the dead tissues, advancing directly towards the parts in which vitality yet remains.

Symptoms of Acute Inflammation.—The coexistence of the phenomena, *redness* and *heat*, with *swelling* and *pain*, the or-

dinary symptoms of inflammation, may, therefore, be considered as sufficient evidence of the presence of the inflammatory condition. The absence, however, of one or more of these phenomena is not incompatible with the existence of inflammation, for the increased redness and heat may disappear before the inflammatory process ceases, and pain be some times absent.

The *redness* of an inflamed part is usually the first observable phenomenon, and one of the most characteristic symptoms of inflammation, and one also that is persistent and due to hyperemia. It varies in intensity, according to the degree of the inflammatory process, the nature of the part affected, the condition of the system, the cause of the inflammation, the freedom from obstruction in the vessels, and the rapidity of the circulation. Of a light tint in the early stage, it becomes deeper as the inflammatory process increases in degree, until every grade, almost, of redness is observable, ending in a deep crimson or even purple. It may appear in points, streaks, in minute ramifications, or be quite uniform over the entire surface affected. Usually it is more intense in one spot, gradually fading as it recedes, until lost in the surrounding healthy tissue; in other cases the redness has an abrupt boundary, and is of equal intensity over its entire area. The bright hue usually attends ordinary active inflammation; the dark or purplish hue that form of inflammation proceding from some specific cause, or associated with a gangrenous tendency, and indicates stasis. The redness of inflammation is caused by the increased amount of blood entering the vessels of the part, and remaining there for a longer time than is natural under other conditions.

The *Heat* of an inflamed part is also caused by the unusual quantity of red blood present, and also by an increase of that vital action upon which the evolution of heat depends, namely, superoxidation of the affected tissues, resulting in their decomposition. It is more marked at the focus of the inflamed area. The increase of temperature is generally more sensible to the sufferer than to the observer, though it may often be detected by the hand, and is very evident by the use of the clinical thermometer; it is also verified by comparison with other unaffected parts; but is never beyond the temperature of the internal organs.

The *Swelling* of an inflamed tissue is caused in part by the

unusual quantity of blood present in the dilated vessels,—the engorgement of the blood vessels of the part, and also by the matters, both liquid and solid, which exude into the affected tissue through the walls of the dilated vessels, and also to extravasation resulting from rupture of these walls; for as the vessels are distended their walls become thinner, and permit the blood plasma to escape through them in greater quantity than is required for mere nourishment; hence the inflamed tissue becomes infiltrated with this plasma, the consequence of which is an increase of thickness or swelling. The swelling of a part, however, without other symptoms is not an evidence of inflammation, as this phenomenon may occur from other causes. Swelling may also be absent when the other symptoms of inflammation are present, an example of which is afforded in inflammation of mucous membranes, before exudation has occurred in the connective tissue beneath. The swelling is soft in acute inflammations, and hard in the chronic form, being especially marked in loose connective tissue.

The *Pain* of inflammation, which is persistent, and increased by pressure, motion, or exercise, is mainly due to mechanical pressure upon the nerve-filaments; and exercise increases the arterial tension and augments the pain. Every tissue is supplied with sensory nerves, and the pain resulting from irritation and injury varies considerably, in accordance with the nature of the part and its supply of nervous filaments. Parts having little sensibility in a normal condition, often become extremely painful when inflamed; the gums afford a well marked example. When the parts are unyielding, as in periodontitis, the pain becomes very severe; and a pulsating or throbbing pain is caused by the increased force of the smaller vessels conveying the blood to the focus of inflammation, and also the obstruction of the circulation produced by the swelling and increased by the stasis at the focus of the affected area. When the veins of an inflamed part become obstructed by the swelling, bringing about pressure to such a degree as to prevent the blood from patting through them, the quantity being constantly increased by the supply from the arteries, a condition of strangulation results, in which the pain is very severe.

We find an example of this condition of strangulation in pul-

pitis, or inflammation of the pulps of the teeth. Pain is also generally present, even in the case of soft tissues affected with inflammation, and where every advantage is afforded for their swelling; the oral mucous membrane is an example. There is also pain of an itching character, in certain forms of inflammation of mucous membranes; also boring pain in the neighborhood of joints. The pain of alveolar abscesses, when they slowly form, is often of a tensive character, and generally becomes lancinating when they are about to point; and in all such cases is useful in determining the seat of the suppurative process. At times the pain is reflected to parts remote from the seat of inflammation, as otalgia in pulpitis, etc.

The acute form of inflammation may change to the subacute and finally to the chronic, examples of which are presented in the different stages of pulpitis and periodontitis. The constitutional symptoms of acute inflammation are sthenic and asthenic fevers: the sthenic being characterized by full, strong, rapid pulse, increased temperature, flushed face, injected conjunctiva, headache, lumbar pains, interrupted sleep, diminished secretions, dark colored urine, thirst, tongue coated white or yellowish, and constipation; and is common in the strong and robust.

Asthenic fever is characterized by a feeble pulse, a fluctuating temperature, a dull, torpid, and at times delirious mental condition, the tongue dry and coated with a brown or black fur; and is common in the very young and feeble and old persons.

The fever of inflammation, also known as "traumatic," is very generally present when the inflammation is severe, or the injury occasioning it is extensive and complicated. This inflammatory fever generally makes its appearance in from twelve to twenty-four hours after the injury is received, or when the inflammatory process is at its height; and when the parts have previously been healthy, and the inflammation limited, it is moderate in its character and soon terminates spontaneously. This fever is indicative of the introduction into the system of poisonous substances resulting from the pathological changes in the exudates or the fixed tissue cells, on account of the action of the specific microorganisms. The symptoms of inflammatory fever are a feeling of fatigue, restlessness, thirst, hot and dry mouth, coated tongue, urine scanty, but deeper in color, frequent pulse, temperature

about 100° F.; and the fever usually reaches its climax in about thirty-six hours, when it begins to decline, and by the sixth or seventh day has disappeared. In the case of an abscess, it frequently happens that when suppuration occurs the fever begins to decline. Should the fever continue longer than the time referred to, the cause may generally be due to deeper suppuration and other complications of the local affection. During the inflammatory process, when putrescent matter has been absorbed by the blood in greater quantity than can be resisted or gotten rid of by the organism, and there is no escape from it by drainage, the symptoms of inflammatory fever become more intense, and a condition of septic poisoning takes place, known as *septicemia*. When some time has elapsed after the inception of the inflammatory process, and the characteristic fever has almost disappeared, a chill suddenly occurs, followed by profuse perspiration, the condition known as *pyemia* is present—pus globules in the blood.

Exudation.—Exudation is a process by which the corpuscular elements of the blood and the liquor sanguinis pass through the walls of the blood vessels into the tissues beyond, and results from changes in the walls of the vessels, which permit the oozing of the blood through their walls— "the loss of the power by the vessels of resistance to dilatation, and the loss of vital power, in consequence of which leakage takes place." The symptom of *swelling* is in great part due to exudation. The exudation in what is termed "healthy inflammation," and known as *plastic* or *coagulable lymph*, seen on the surface of a recent wound or in the form of swelling around a centre of inflammation, is a mild and unirritating product, the function of which is to form new tissues for repair, called at first granulations. Inflammatory exudations from free surfaces of mucous membranes contain mucus, and a substance known as *mucin*, in the form of filaments, insoluble in acetic acid. The inflammatory effusion known as *plastic* or *coagulable lymph*, the true indicator of a healthy constructive process, is soon converted from a jelly-like substance, by the germinal power, into a mass of living cells, through which other minute cells, which are to form the capillaries, make their way like a small stream, the primitive living cells flattening out, and making walls, apparently, for the forming vessels. These new

capillaries penetrate the mass of germinal cells in large numbers, like delicate connecting threads, and furnish the blood supply to the organizing mass, which becomes converted into *new* and *young connective tissue*. This tissue drawing and binding together the opposite sides of the wound then becomes the *cicatricial tissue*, which originates from the cement-like material furnished by the inflammatory exudation. The cicatricial tissue becomes invested, in the case of oral mucous membrane, with epithelium, by a similar process of cell growth and development; and this is the process of union by the first intention. The cicatrix or scar is redder than natural, owing to the large number of vessels; but when the supply of blood is not longer needed in such quantity as is at first necessary the capillaries diminish and disappear, so that the cicatrix grows paler and of smaller bulk. In the case of an abrasion of the skin, the exuding plastic lymph dries upon the denuded surface when not disturbed, and forms a protecting crust, which at length falls off, exposing a reddish surface covered with epidermis. In the case of the oral mucous membrane, a like result is produced under the protection of the mucous secretions peculiar to such a tissue.

Suppuration.—Suppuration is the formation of pus, and is the most frequent termination of acute inflammation, and is a process by which the leucocytes and the embryonic cell formed from the fixed tissue-cells are converted into pus-corpuscles and the intercellular substance of the tissues undergoes liquefaction.

When pus forms an abscess, owing to some chemical substance in its composition, it exerts a solvent action upon the tissues, which is shown by the presence of broken-down tissue cells and remains of tissue, mixed with pus-corpuscles. Suppuration is directly caused by the action of certain specific micro-organisms, and also by certain chemical irritants introduced under the skin. The formation of pus is a result of destructive inflammation, as the presence of such a fluid denotes a loss of substance, which does not occur when a wound heals by *the first intention*. Under favorable circumstances an inflamed surface, when destruction of tissue has occurred, heals by the process of *the second intention*, as follows: A soft, red surface of coagulable lymph becomes organized into embryonic tissue, which is

known as *granulation tissue*, and the yellowish fluid, bland in nature, which is present, is pus; these materials, or "products of inflammation," being generated for reparative processes. The granulation tissue is composed of embryonic cells and a network of capillary loops, about which are clustered a number of living leucocytes held together by a delicate intercellular material, by which the tissue receives its supply of nutritive matter from the blood, so that it may become what is recognized later as the *cicatricial tissue*, or one of a higher organism than the granulation tissue. The healthy granulation tissue is of a variable pinkish, or cherry-red color, the tint depending upon the quality of the blood which its vessels contain, and is of a jelly-like consistence, and somewhat smooth and firm. Its surface, when in a normal condition, is studded over with small conical prominences called *granulations*, in which very minute vessels are situated very superficially. Healthy granulations are also non-sensitive, elastic, and discharge laudable pus. Unhealthy granulations are coarse, dark red in color, and bleed readily.

Pus of a yellow color is found between the granulations, which vary in size, form and color, a moderate bright-red color being indicative of a healthy healing process.

When there is a want of power in the process of forming the cicatricial or repair tissue, the granulations become large and translucent, and the pus which surrounds them is pale and thin. If the affected surface is exposed to friction, or irritation from other causes, the granulations become extremely small and of a deeper red color than is normal, and at length may disappear at points, leaving grayish spots or smooth patches. If the process of cicatrization is prevented in its first stage, the granulations become large and coalesce, protruding and overhanging the edges of the wound, and forming what is commonly known as "proud flesh." During the entire healing process a flow of pus is going on from the affected surface as a normal act, and the first appearance of it is indicative of repair. Its appearance is also coincident with the organization of plastic lymph. When the suppuration is well established, the heat, tension and swelling of the inflamed part becomes less in degree, and the frequency of the pulse and the temperature of the body diminish. Whenever the granulating surface is formed, union by the *second intention*, or

second adhesion, as it is termed, will take place, if separated surfaces are brought into apposition.

Origin and Characteristics of Pus.—Pus is a secretion furnished by the blood at the expense of the tissues, an exuberant quantity of plastic material, for which excess there is no demand in the reparative process. The leucocytes which are brought to the surface of a granulating wound are discharged from it in the form of pus, while those that remain behind develop into tissue. This effect, by which the excess of leucocytes is gotten rid of, is accomplished by liquid exudation, the supply of which comes from the newly-formed and the old capillaries, and is the same force that carries the nutritive material to the tissues. Healthy pus is of a yellowish-white color, sometimes assuming a pale greenish tint, of cream-like consistence; a slightly saltish taste, but somewhat sweet; a faint animal odor, with an alkaline reaction. The presence of bile may give to pus a deep orange color, while all of the other shades are due to the coloring matter of the blood, known as hæmatoidin. As long as the air has access to it, there is little tendency to putrefaction; and even when it is removed from the body and exposed to ordinary temperature, change in it occurs very slowly. Pus consists of two portions—a solid portion, know as *pus corpuscles*, and which consists almost entirely of young pus cells or leucocytes, and a liquid portion known as *liquor puris*, which is a serous fluid, and constitutes about three-fourths of its bulk.

When pus is subjected to pressure, as sometimes occurs in abscess of the antrum, and about bones, it may become a yellowish, cheesy mass, owing to the compression of the pus cells. The solid portion of pus consists of more than nine-tenths of leucocytes or young pus cells, which, in freshly formed pus, presents under the microscope a granular appearance, and also the peculiar movements of active, young and healthy leucocytes; but pus which has collected in an abscess for several days shows no such movements, thereby indicating that the leucocytes have died. Living and dead pus cells may be found in ordinary pus, mingled together. The most common forms of micro-organisms which produce suppuration are the staphylococci and the streptococci.

Varieties of Pus.—The constitution of pus, which is subject to

constant change, depends upon the form of the disease, the locality and the condition of the patient. When pus is of a yellowish-white color, of the consistence of cream, and composed of a great number of pus globules, it is called "healthy," "pure," or "laudable." When pus is thin, reddish and mixed with blood, it is termed "sanious" pus, and is common to diseases of the bones, irritable ulcers, etc., and is also frequently mixed with particles of fibrin, and dead tissue. In chronic and cold abscesses the pus-corpuscles become pale and watery, showing that they are undergoing solution; the pus from epithelial tumors, indolent ulcers, and phagedenic ulcers, is thin and sanious, and contains more or less dead tissue, which prevents the repair.

Thin, watery, acrid pus is termed "ichorous," and is common to chronic ulcers, bone diseases, etc. Thin, watery pus from inflamed mucous membrane, is termed "muco-pus." Thin, watery pus, containing fibrin and coming from serous membranes, is termed "sero-pus." Thick, ropy pus from syphilitic abscesses, is termed "gummy pus." Sanious pus, containing flakes of coagulated fibrin, common to chronic abscesses, and bone disease, is termed "curdy" or "cheesy" pus.

Abscess.—The term *abscess* denotes a collection of pus in the substance of the tissues, surrounded by a wall of lymph. The formation of the acute form is as follows: The exciting cause, acting as an irritant, induces an afflux of blood to the centre of the affection, and the distended capillaries pour out liquid exudation, which coagulates at this centre into plastic lymph, expanding the meshes of the neighboring surrounding tissues with a more serous fluid.

Leucocytes are formed from cell proliferation in the plastic lymph; but, on account of their not being in a proper place for their growth and development into tissue, they become changed into pus, which collects in a cavity formed by it, and the result is an abscess. As these phenomena occur in rather quick succession, pain, heat, redness and swelling are present, and also constitutional disturbance in the form of *hectic fever*.

The increase of an abscess in size is attended with a certain amount of redness on the surface over it and to which it is approaching, this increasing redness being preceded by more or less œdema of the tissue beneath, which is owing to the protruding

of the serous exudation surrounding the central collection of pus. The centre of the surface redness then presents a more prominent and elevated point, where the outer tissue becomes thinner, purplish, or livid, and soon the yellow pus within is visible through it—a condition to which the term *pointing* is applied. Soon after the "pointing," the integument gives way, and the pus exudes through the opening thus made.

This thinning and weakening of the surface is caused by the stretching and obstruction of the blood vessels, which convey the nutritive supply from beneath, by the pressure of the enlarging abscess to such a degree that the surface integument is deprived of its blood and slowly dies by minute particles, the dead material being added to the contents of the abscess.

An abscess unattended with such symptoms as pain, heat, and redness is termed a *cold abscess*, and its presence depends upon a low degree of vitality. Such an abscess presents the same phenomena of pus formation as the acute form, but resembles more the growth of a tumor, as all the symptoms may be absent except the swelling. The formation of pus on the surface of a tissue, such as mucous membrane, is not so serious as that in an abscess, as the conversion of the leucocytes into pus requires but little more increased activity than in cell germination. The exudation takes place from the network of capillaries which exist beneath every mucous membrane, and which furnishes nourishment for the constant renewal of the epithelium, and any injury received causes a fluxion of blood to the capillaries, which increases the cell proliferation. The effect is, then, to promote an increased discharge from the surface of the membrane, in the form of pus. Suppuration from mucous membrane usually causes pain, heat, increased redness, and swelling of the inflamed surface, owing to the exudation into the meshes of the connective tissue beneath, and recovery is characterized by diminished fluxion of blood to the affected part, and consequent lessening of cell production; the cells resume their function of producing epithelial tissue, the pus becomes thin and more fluid, and finally ceases when the normal conditions again appear

Hectic fever is a symptom of destructive inflammation, and is a persistent, low form of continued fever, characterized by remission and exacerbation morning and night. This form of fever is

caused by absorption into the blood of some of the products of inflammation, in such quantities and so gradually as not to produce an immediate fatal result, and inducing a regular succession of chill, fever, and perspiration during the space of every twenty-four hours. Its effect is progressive emaciation and a tendency to fatal termination, if the cause is not removed, through combustion of tissue material to supply the fever heat. The regularity of the night sweats, and the pulse retaining its frequency during the apyrexia, even in the morning, when the temperature is normal, are the diagnostic signs of hectic from typhoid and malarial fevers.

The most unfavorable symptoms of hectic fever are the higher fever in the evening, the increase in the frequency of the pulse, the more exhausting night sweats, with the occurrence of aphthæ in the mouth, and diarrhœa.

Chronic Inflammation.—Chronic or asthenic inflammation is a process in which all the cardinal symptoms of inflammation may be present, but in less degree than in the acute form, by which it is generally preceded. In chronic inflammation there is present a permanent local hyperæmia, attended with an exudation into the interstices of the inflamed part, or from its surface. The pain in this form is usually light, or may be intermittent, or even absent, or be no more than an itching sensation; heat is present, but is not a prominent symptom; the redness is of a light hue, sometimes livid, from passive hyperæmia and the stretching of the vessels by the over-distention to which they had before been subjected, and the diminished force of the circulation; the swelling is in the form of induration, owing to the exudation having become organized into tissue. This latter accounts for the hardness around an indolent ulcer, and an old sinus. *Inflammatory induration* is a process of hardening the tissues due to coagulation of the fibrinous elements of the exudates or the fixed tissue cells, and new formations in the connective tissues. In mucous membranes induration is indicative of chronic inflammation, and is caused by exudative infiltration into the substance of the submucous connective tissue, and a considerable change of structure in these membranes often occurs. Although the symptoms of chronic inflammation are present in a limited degree, yet they are more persistent, on

account of the object for which the increased nutritive effort was made proving unsuccessful. *Causes.*—The causes of chronic inflammation are long-continued irritation, functional activity, and constitutional dyscrasia, or diathesis; and its terminations are induration, hypertrophy, tumefaction, suppuration, ulceration, fatty degeneration, the formation of cold abscesses, and caseation. The local symptoms differ from those of the acuter form only in the degree of severity.

Terminations of Inflammation.—According to the present knowledge of this subject, inflammation terminates—1st, *By Resolution;* 2d, *By Suppuration;* 3d, *By Formation of New Tissue;* 4th, *By Gangrene* or *Local Death—Necrosis.* When the inflammatory process terminates by *resolution*, all of the symptoms gradually diminish and disappear, and the affected tissues resume their normal condition. Such a result is generally due to the mild character of the injury, and the progress of the inflammation. *Resolution* is the most favorable ending of inflammation and is established so soon as the blood which circulates through the vessels restores their walls to a healthy state.

When the inflammatory process terminates by *suppuration*, there is a loss of substance, and after the discharge of the pus, a more extensive process of repair is required to produce a healing of the wound by the growth of granulation tissue, and the formation of the cicatrix. (See Suppuration and Abscess.)

When the inflammatory process terminates by the *formation of new tissue*, the new growth is produced by inflammation—either by the union by first intention, or by the development of granulations, which become organized into a cicatrix.

When the inflammatory process terminates in *gangrene* or *local death*, the effort of the inflammation toward repair has failed, either on account of the functions of the capillaries and the connective tissue becoming impeded to such a degree as to render inoperative the resources of the organisms, or because of certain conditions arising at a later period which have obstructed the reparative effort and caused the parts to lose their vitality.

The termination of the inflammatory process by *gangrene* depends upon the degree and nature of the lesion, and the inability of the capillaries and arteries to maintain the local circulation. The impairment of the vitality of the blood vessels causes stasis

and thrombosis to occur, and as soon as actual death takes place, the dead tissue presents a further obstacle to the local circulation, and also adds to the difficulty of elimination, which favors the spread of the gangrene. The earliest symptoms of gangrene are hard swelling, burning and tensive pain, and livid color. The pain then subsides, vesications appear, the part takes on a marbled, purplish-yellow color, afterward becoming brown or grayish, and finally cold and insensible, exhaling a putrid odor. (See Gangrene, Necrosis of Bone, and Caries of Bone.)

Treatment of Inflammation.—It has already been stated that the causes of inflammation determine in a great measure its treatment, and this is especially true of inflammation of the oral mucous membrane. As acute inflammation is now recognized as the result of the action of certain specific micro-organisms, both prophylactic and curative treatment by antiseptic methods is very satisfactory. The old method of antiphlogistic treatment has given place to antiseptic treatment, although some of the older measures are still employed, and may occasionally be used to advantage in relieving certain symptoms of inflammation, and thus favoring a return to the normal condition. The indications of treatment are as follows:

Prophylactic Treatment, which consists in protecting avenues of infection against the entrance of pathogenic micro-organisms into tissues deprived of their natural coverings, such as the skin and mucous membrane, by first securing an aseptic condition of the parts, and maintaining this by thorough sterilization. Inflammation is prevented if pus-forming microbes are excluded so thoroughly as to prevent their infection of wounds. Prevention may also include the removal of a predisposing cause when local, or the lessening of its effects when it is general or constitutional. If malaria is present, quinine is indicated; if syphilis, iodide of potassium, or minute doses of bichloride of mercury. Irritation, the precursor of inflammation, may often be arrested by the removal of a local cause, such as salivary calculus, or the removal of diseased teeth, or of foreign substances, for example.

Curative Treatment consists of both local and constitutional measures. The restoration of the secretion of the different organs is indicated in the treatment of certain forms of inflammation, and also the use of such palliative remedies as will allay the

excitement of the nervous system. When the cause is apparent, its removal is, as a general rule, easily accomplished; but when the cause is obscure, the condition of the secretions of the bowels and the diet should receive careful attention. To correct the secretions, purgatives are indispensable; also such other depletory measures as bleeding, abstinence from food, use of emetics or nauseants to lessen the general circulation and reduce the vascular tension. To allay the nervous excitement and irritability, anodynes, narcotics or opiates and general sedatives are indicated, their direct effect being relief of pain and spasm, and inducement to rest and tranquillity. Morphine in small, but repeated doses will cause contraction of the small vessels as well as relieve pain; acetanilide acts as an anodyne, and quinine and salol correct internal disturbances.

Local Treatment.—The advantage of *rest* and *immobility* cannot be overestimated, for a simple lesion, if subjected to constant mobility, may become one of a much greater character, destructive inflammation often being provoked by friction and undue motion. An example is furnished in the case of periodontitis, where a cap or partial interdental splint made of modeling composition or gutta percha, or vulcanized rubber, will protect the affected tooth from irritation, and materially assist the remedial measures; also strips of adhesive plaster, collodion, etc., will insure immobility in certain cases where such appliances are indicated, as undue motion retards and prevents the process of healing.

Position is also to be considered as a means for relieving the irritation and pain, so that no provocation may exist for subsequent inflammation. The best position should be selected for the affected part, which will favor the return of venous blood and retard the arterial current; hence, an elevated position will tend to prevent passive hyperæmia. A favorable position will also secure muscular relaxation, and prevent the involuntary spasmodic action, which may result from muscular tension. The administration of an anæsthetic to secure muscular relaxation, in the case of certain injuries, as in fracture or dislocation of the jaw, is often resorted to as a measure against spasmodic contraction, and also to reduce the excessive vascular reaction.

Cold, when outwardly applied as a depressor to the inflamed

part, reduces the excitement and irritability. The application of the spray of absolute ether, or of rhigolene, will often prove serviceable in the early stage of periodontitis. Cold, whenever moderately applied, is tonic and invigorating, and besides evaporating applications, ice may be employed; but such local measures to maintain a low temperature must be renewed at short intervals. Cold, when locally applied, causes the capillaries to contract, thus diminishing the afflux of blood to the affected tissue. The persistent application of cold, however, may cause gangrene; but the employment of the ether or rhigolene spray is attended with less danger in this respect than that of ice applications. A granulating surface, on the other hand, develops better in a warm temperature.

Heat and Moisture.—Heat is also under certain circumstances a valuable antiphlogistic. Dry heat will mitigate pain, and heat with moisture in the form of a poultice, is very commonly used to relieve the pain and tensive heat of local inflammation by its soothing and relaxing effect. While cold has an astringent, sedative effect, and constringes the capillaries of the inflamed tissue, thus promoting healing by resolution, moist heat is relaxing and promotes exudation, if not suppuration, leading to repair by "the second intention." The use of cold is dispensed with in inflammatory conditions as soon as it is apparent that the termination of the inflammation by resolution is impossible, when resort is had to poultices or warm fomentations, such as flaxseed and slippery-elm bark, to which vaseline, boracic acid, or a weak solution of carbolic acid may be added to prevent fermentation in the poultice, and putrefaction in the wound. To relieve pain, tincture of opium may be applied to the surface of the poultice, a water-dressing composed of cloth saturated with warm water, or a medicated solution, such as boracic acid or biborate of sodium. The local warm bath is also another method of applying heat and moisture, as the granulations of a surface immersed in tepid water develop favorably; and an ulcerated surface which has been subjected to a prolonged warm bath, made antiseptic by carbolic acid, or the application of an eight per cent. solution of chloride of zinc, is greatly benefited. Warmth and moisture are especially indicated for parts having a feeble circulation. Warm, moist applications, such as

poultices, promote the tendency to suppuration; hence, care should be observed in applying such applications to the surface of the face, in the case of an alveolar abscess, as pointing and the escape of pus may be induced in a position where permanent disfigurement would be very apparent.

Compression is also of service in the treatment of certain forms of inflammation, especially during the late stages; but it must be uniformly, moderately, and continuously applied. Even in the acute form, compression may prevent the over-distention of the capillaries and limit the exudation; in the chronic form, compression promotes absorption. It is accomplished by means of bandages, either alone or in conjunction with cotton batting, as the latter prevents irregular constriction and maintains a uniform temperature. A fine compressed sponge moistened, after it is applied, with tepid water, is a painless and effective means for obtaining compression in the treatment of indolent ulcers. Compression by means of sheet lead or tin, and pads of bibulous paper, will often prevent an alveolar abscess from discharging on the surface of the cheek or neck, when such an event is imminent.

Blood-letting.—General blood-letting is now rarely employed in the treatment of inflammation; but the local abstraction of blood by means of leeches, cups, scarification, incisions, and other means, is of great service in reducing vascular action, and lessening inflammatory symptoms. The efficiency of local depletion in relieving hyperæmia is very evident by the cessation of pain caused by strangulation and tension. Periodontitis and acute gingivitis furnish examples. Leeches should never be applied to a part where it would be difficult to arrest the hemorrhage which may follow their use; their application is also contra-indicated in the case of children, who cannot bear the loss of considerable blood with impunity.

Incisions are made for the purpose of relieving tension and pain, evacuating pus, or the escape of dead material, for tension aggravates the inflammation and the retention of pus in an abscess prolongs the pain, and also adds to the destruction of parts by the formation of gangrenous patches. Superficial incisions will relieve the tension of the skin and mucous membrane, and also evacuate the pus of an abscess when it is near the surface.

Deeper incisions are necessary when the pus is at a greater distance from the surface, and there is considerable tension. Incisions are also often judicious as a prevention of suppuration and ulceration; also in cases where the presence of pus is suspected, but there is no apparent fluctuation. In making deep incisions, care is necessary to avoid wounding arteries and nerves; hence the director should precede the use of the knife. In acute abscesses the incisions should be made at an early stage, and of such a size as will permit of the free evacuation of the pus, and in the most depending position, to insure its easy discharge. Hence, as soon as fluctuation is detected in an acute abscess, the incision for the escape of the pus should be made; while in the case of a chronic or cold abscess, the incision may be delayed, or a puncture with a trocar substituted for it, which may at once be closed.

Drainage (or Irrigation) is employed for the purpose of giving outlet for any matters liable to collect in a wound or abscess which may act as obstacles to the process of repair. Teeth affected with abscess are often relieved and retained by an opening made into the pulp canal or into the abscess sac, sufficiently free to relieve the tension and drain off the accumulated pus; also in the case of abscess of the antrum, where an opening made through the alveolar cavity of one of the roots of a posterior tooth is kept open by means of a canula, to relieve the tension and permit the pus to escape as it accumulates, and also to afford an easy entrance for the injection of antiseptic and stimulating agents in the treatment of such cases. Drainage can also be made through soft tissues, such as the gum, etc., by strands of floss silk, hemp thread, and horse hair, dipped in a carbolic acid solution before they are inserted into the opening connected with the sac; also by means of caoutchouc tubing.

Counter Irritation, "counter irritants," or "derivatives," are also employed in the treatment of inflammation, for the purpose of inducing an affux of blood from the locality of the inflammation to another point in close proximity, thus relieving the vessels of the affected part. Such counter-excitement in the case of the oral mucous membrane, is induced by blistering applications, stimulants, escharotics, etc., which excite a new action in a part more or less remote from the focus of inflammation.

Cantharidal collodion, tincture of iodine, either alone or in combination with aconite, or with creasote, or with carbolic acid, nitrate of silver, nitric acid, and the actual cautery, may be named as the most common counter-irritants for application to the oral mucous membrane in the case of deep-seated inflammation and pulpitis, and are mainly useful in the early stage of the acute form, and in the chronic form.

Antiseptic and Germicide Mouth Washes and Lotions, such as tincture of myrrh, chlorate of potassa, solutions of carbolic acid, listerine, permanganate of potash, nitrate of silver, sulphate of copper, sulphate of zinc, lead water, tincture of opium, aqueous solution of pyrozone, bichloride of mercury 1 to 500, 1 to 1,000, 1 to 2,000, 1 to 4,000. Carbolic acid 1 to 20, 1 to 40. Formalin 1 to 2,000. Iodoform, creolin, peroxide of hydrogen, chloride of zinc, boric acid, sulpho-carbolate of zinc (which is less irritating and more potent than the chloride of zinc), etc., are employed with benefit in inflammations and ulcerations of the oral mucous membrane.

When putrefaction is present in the inflamed part, chlorinous washes are serviceable for deodorizing purposes, and also to prevent the entrance of putrid matter into the circulation. The object of cauterizing an inflamed part is to break the continuity of the morbid process.

Anæsthetics, such as chloroform, ether, etc., when employed in the treatment of inflammation, exercise an influence as preventives, and also render lax tissues which become very rigid, and enable reductions to be made, as well as temporarily mitigating the pain; fracture and dislocation of the jaw are examples.

When inflammation has devitalized parts, the treatment varies in respect to the nature of such parts. Dead, soft tissues are to be so treated that the putrid matter is prevented from entering the circulation, by the application of antiseptic agents, and by maintaining thorough sterilization; hence, antiseptics which possess the power of destroying micro-organisms without the danger of destroying the vitality of the tissues, are considered to be the most active agents of this class. When the hard tissues are devitalized, such as bone, for example, although the living bone becomes separate from the dead portion as effectually as a living soft part from its slough, yet it is necessary to liberate the bony

sequestrum from the overlying texture which may confine it; hence the removal of dead bone is necessary as soon as the line of demarcation is formed, the time for which may vary from a period of less than three weeks in the case of small sequestra, to more than two months, where the entire bone is involved. Also in cases where the extremity of a part consisting of soft and hard tissues, for example, the alveolar process and tissues over it, become gangrenous, it is best, in most instances, to remove the dead tissues by amputation; and such an operation may also become necessary in cases of long-continued exhaustive suppuration. Many forms of inflammation have their special remedies, such as mercurial inflammation of the mouth, when chlorate of potash is indicated; periodontitis, when tincture of iodine and tincture of aconite, or creasote, or carbolic acid, in combination with the iodine, or iodine, aconite, cannabis indica, and benzoin in combination, etc., are indicated; gingivitis, where stimulating and antiseptic washes and lotions of tincture of myrrh, biborate of soda, boric acid, carbolic acid solutions and combinations, etc., are indicated. The spray of liquid air is useful in aborting periodontitis, alveolar abscess, also in advanced stages of abscess after incision, in all inflammatory and ulcerated conditions of the oral mucous membrane, etc. (See Liquid Air.)

Constitutional Treatment.—Cathartics are serviceable for removing the unwholesome ingesta and irritating fecal accumulations from the stomach and bowels, and also for stimulating the secretions of the gastric and intestinal glands, the liver, pancreas, etc., they also eliminate through such organs the toxic elements introduced into the blood; also by their revulsive action, reducing or withdrawing nervous action from the inflamed part. Diuretics and diaphoretics are useful for promoting elimination of toxic substances through the kidneys. Diffusible stimulants are useful for heart failure, such as brandy, whiskey, and cognac The temperature can be reduced by sponging the surface of the body with tepid water, or by the use of the warm bath.

Diet.—The diet is of great importance in all forms of inflammation. Food of the most nutritious character and of a form easily digested is very necessary. Milk, pure, or mixed with lime water, peptonized or sterilized, or in the form of gruel, is the

most valuable of all liquid foods; alcohol may be given with it in the form of wine whey. Meat broths are nutritious and digestible, and pure beef juice is very reliable. When food cannot be taken by the stomach, enemata of beef broths, and some of the various peptonized forms of meat, may be given by the rectum. A few drops of laudanum with the enema will assist in retaining food thus given. After the fever and inflammation subside, the solid forms of food may be given more freely. Tonics, such as iron, calisaya bark and the phosphites, are then indicated to improve the appetite and favor repair.

Ulceration is a passive process, and results from the molecular death caused by insufficient blood supply, insufficient nervous influence, impure quality of blood, or the presence of blood poison. Ulceration is very closely associated with inflammation, although the former may be independent of the latter, and consists of a progressive sortening and disintegration of successive layers of the affected tissue. Ulceration generally begins in a process of chronic inflammation, and in such a manner that the death of the tissues only occurs when the tissues themselves have undergone cellular infiltration in consequence of the inflammatory changes. The loss of the integument leaves a red, raw surface, which bleeds easily, and which is covered with a tenacious, slimy matter. Very soon irregular cavities are formed in this surface, separated by red elevations with ragged edges. A thin, serous, bloody discharge exudes, with severe pain of a gnawing character. The ulcer then formed, and which has been defined as "a wound surface having no tendency to heal," or an "open sore," spreads more or less rapidly, and the surrounding integument is hot and swollen, and the disintegrated tissue is thrown off as extraneous matter. It originates from an excess in action of the retrograde changes over such as induce repair. Ulcers also originate from pustules that fail to heal after the pus escapes, but spread and maintain an acute inflammatory character. An ulcer may be circular, crescentic, irregular, in the form of a shallow or deep ring, or it may be tubular, forming a fistula.

The edges of an ulcer are either low or raised, hard (callous), soft, jagged, vertical, everted, or undermined, etc. Ulcers arising from persistent local irritation, as those of the oral mucous

membrane, usually heal as soon as the affected parts are placed under favorable external circumstances. As long as the epithelium is preserved, the superficial inflammatory process in mucous membranes may be called catarrh. When suppuration of mucous membranes proceeds so far as to expose the *substantia propria* or corium, the diseased surface is known as an ulcer. The surface of an ulcer is covered with coarse granulations of a dark red color, while healthy granulations are cherry red in color. The ulcer granulations bleed readily. Age, sex, and occupation, are important factors in the etiology of ulcers, as age is characterized by diminished physical power and vital resistance, and retrogressive tissue changes. Ulcers are three times as prevalent among men as among women: they are also more prevalent among the laboring classes, owing to a greater degree of exposure to injuries, and also to a greater neglect of personal cleanliness. Ulcers are classified according to their origin, such as the non-infectious and the infectious. The non-infectious comprise those caused by friction, pressure, or other mechanical injuries, chemical irritation, enervation, impaired nutrition, and obstructed local circulation.

Ulcers are also classified as inflamed, irritable, fungous, hemorrhagic, torpid, callous, corroding, perforating, phagedenic, and malignant. An inflamed ulcer is characterized by swollen edges, surrounding skin very tender, dense and shining, and the base and surrounding parts more or less acutely inflamed. The irritable ulcer is characterized by abrupt edges showing no tendency to cicatrize, and extreme tenderness or sensitiveness. The fungous ulcer is characterized by an exuberant growth of granulations. The hemorrhagic ulcer is characterized by a tendency to bleeding upon the least provocation, and is common to scurvy. Torpid ulcers are those which manifest no disposition of activity in any direction. Callous ulcers are characterized by a dirty, granulating surface covered with thin, muco-purulent pus, and prominent edges. Corroding ulcers are destructive, progressively, of soft tissues, beginning as a cutaneous disease, which becomes a boil and afterward an ulcer. Perforating or round ulcers are peculiar to the stomach, and caused by local obstruction of its blood vessels. Phagedenic ulcers spread rapidly, with great local irritation, and loss of tissue. Malignant ulcers are characterized

by a rapid, spreading course, with perforation of soft parts, and resulting in gangrene and sloughing, and necrosis of bone.

The process of healing in ulcers is brought about by granulation and cicatrization, the devitalized parts separating from the living parts in the form of a thin, ichorous discharge, the exudates beneath and about the walls of the ulcer becoming vascularized and loops of capillary vessels forming and growing toward the surface. Numbers of leucocytes cluster around these capillary loops, and thus a healthy surface is formed which discharges a creamy pus-laudable pus.

Cicatrization is a process of skin-growth which covers over the new granulation tissue, the surrounding surface of skin or membrane sinking to a level with the granulations and the edge of the ulcer undergoing change in consistence and color, and the epithelial cells undergoing segmentation, and growing toward the centre of the ulcer, which is indicated by a blue film. At the same time the ulcer is contracting, and continues for a considerable period, and often causes great deformity.

The cicatrix is different from the original substance, having neither nerves, glands, lymphatics, nor hair, and when injured is prone to ulcerate.

The causes of ulceration are divided into predisposing and exciting, local and constitutional. The predisposing causes are changes in nutrition, peculiar dyscrasiæ, and diatheses, the rapidity of the circulation, and injuries which are the most frequent causes, especially in the aged, the feeble, and those suffering from some constitutional diathesis, such as tuberculosis, syphilis, gout, diabetes, etc. Common ulcers are of the mucous membrane and skin and are never fatal except through septic infection.

Treatment.—The treatment of ulcers is both local and constitutional, the cause of irritation being first removed and the inflammatory symptoms relieved. Rest of the affected part, cleanliness, hot antiseptic applications, elevation of limb when an extremity is involved. Stimulating remedies such as nitrate of silver, permanganate of potash, sulphate of copper, iodine, boric acid, balsam of Peru, and ichthyol, especially in indolent ulcers, and spraying with liquid air, are excellent. Chromic acid is useful in secondary syphilitic ulcers. Iodine and iodoform are serviceable in tubercular ulcers. Skin-grafting and plastic flap

operations are sometimes resorted to for the purpose of closing extensive ulcers; also sponge-grafting to hasten the process of healing. The constitutional treatment of ulcers is directed to the systematic condition, when it is a predisposing cause, and appropriate remedies administered for its eradication. The strength must be supported by the use of tonics, and a vegetable diet recommended, and also abstinence from wine and malt liquors, etc.

The Regeneration of Tissue.—Connective tissues which have been destroyed by the inflammatory process are restored by the formation of granulation tissue composed of rounded flesh masses; a repair or healing by second intention. In such a process the leucocytes in great numbers occupy the surface of the wound, some of which degenerate into pus cells, while the others multiply forming fibroblasts, about which loops of blood vessels are formed. The wound being thus filled up, if on mucous membrane, epithelium grows from the sides and covers the granulation tissue, which latter, at first highly vascular, then contracts and becomes lighter in color, owing to the obliteration of many of its vessels. A scab is formed upon the surface of a wound by the drying of the exudation and leucocytes, beneath which granulations grow and an epithelial covering is formed. When healing occurs under a clot of blood, the clot is invaded by leucocytes which liquefy it, and granulations grow into it and remove it by resorption; this is a form of healing following the extraction of teeth.

It is often necessary as in the case of abscess, that the healing process should begin at the bottom of a wound or cavity, and to bring this about the cavity is packed with antiseptic gauze, and irrigation kept up, especially if a fistula is present; this may be necessary if the orifice of the cavity should close before the granulations have filled such a cavity.

GANGRENE.—Gangrene signifies the mortification or death of a part of the body, owing to failure in nutrition, and death of soft tissue. There are two forms of gangrene—the dry or senile, and the moist. Dry gangrene—mummification—occurs from death of the soft tissue of parts exposed to the air, and results from defective blood-supply owing to feebleness of the circulation and changes in the vessels. The diseased part be-

comes engorged with blood, and the coloring matter transudes the tissues, and the part assumes a dark red or purple appearance. The tissues begin to dry from evaporation, and the affected part becomes leathery, hard, and brittle, and also black; between the dead and sound tissues there is an inflammatory zone, or line of demarkation. Usually there are no general constitutional symptoms. Moist gangrene is a form of the disease where the death of the soft tissue is followed by decomposition and putrefaction, the result of the presence of micro-organisms entering either through the air or the circulation. The decomposed tissue has the characteristic odor of putrid animal matter, disintegrating and liquefying. Gases form, causing puffiness of the part, pressure on which causes crepitation. The symptoms of moist gangrene are those of acute inflammation, great congestion and an intense burning pain. The constitutional symptoms are a low type of inflammatory fever, rapid feeble pulse, and low delirium.

A frequent cause of gangrene is inflammation of the walls of the arteries (arteritis), which results in the formation of new tissue within the walls of the vessels, and obstructs the flow of the blood.

Treatment.—The treatment of gangrene consists in efforts to remove the primary cause, support the strength by a generous diet, and use of stimulants. Digitalis is indicated in case of a feeble heart, and bitter tonics to improve the appetite. When gangrene attacks the face and mouth, the dead tissue should be removed as soon as the line of demarkation is established, and the wound treated on antiseptic principles. Boric acid solution and Thiersch solution are valuable antiseptics for use in the oral cavity.

Necrosis.—Necrosis signifies the death of bone-tissue, and corresponds to gangrene of soft parts. The degree of injury, traumatic or idiopathic, which is required to cause necrosis, is much less than that necessary to cause death of the soft tissues. This is due to the fact that the external (superficial) layers of bone receive their supply of blood from numerous small vessels given off from the periosteum, and the separation of the periosteum from the bone, which sometimes occurs from the pus of an alveolar abscess making its way between the bone and the

periosteum, deprives the external layer of bone of its blood-supply and causes necrosis. The occurrence of stasis resulting from the Haversian vessels of bone becoming obstructed owing to the presence of inflammatory stimulus which demands a larger blood-current and more blood-cells, and which these vessels cannot supply, on account of their inability to enlarge, is another reason for the susceptibility of bone to necrosis.

The devitalized portion of bone is called a "sequestrum," and the devitalized soft tissue is called a "slough." Necrosis may involve a small portion of a bone, or it may affect the entire bone.

The dead portion of bone becomes detached from the living tissues by the formation of granulation tissue between the devitalized and living portions, and finally the disintegration of this tissue separates the dead portion. Pus is always present, and around the necrosed bone, there is an accumulation of a fetid, purulent fluid, which contains broken-down tissue and débris resulting from decomposition as well as from the inflammatory process; the purulent fluid penetrates the tissues and reaches the surface.

The necrosed portion is lighter than living bone, on account of the organic portion having been removed by decomposition and the action of the granulation tissues.

Necrosis of bone is caused by impaired or arrested blood-supply, which may result from injury, inflammatory conditions induced by mercurial ptyalism, syphilis, phosphorus poisoning, extensive inflammation of neighboring parts, or any cause which impairs the vitality of the tissues. Fractures and inflammation of the periosteum (periostitis) are the most frequent causes of necrosis.

Necrosis of the jaws is much more common to the lower than to the upper jaw, which is, no doubt, owing to the greater nutrition of the upper jaw which not only renders it less liable to injury resulting in periostitis, but also increases its recuperative powers. The toxic forms of necrosis are due mainly to mercury, phosphorus, and arsenic.

The form known as "phosphor-necrosis" due to the vapor of phosphorus coming in contact with the periosteum and producing periostitis, and which may occur on exposure to such

fumes after the extraction of teeth, manifests itself almost entirely in the lower jaw.

Phosphorus-necrosis commences as inflammation of the periosteum with the production of osteophytes, and results in nearly total necrosis of the entire bone.

Necrosis of the jaws may be either partial or complete—partial when it is confined to the alveolar process, complete when the entire thickness of the bone is affected. The causes are the same as those of periostitis, such as injuries, eruptive fevers, syphilis, periodontitis, scorbutus, mercurial, phosphorus, and arsenical poisoning, and ulceration of the soft tissues. The symptoms of necrosis are in the beginning the same as those of periostitis or periodontitis, and after the disease is established, the pus escapes by the side of the loosened teeth and the gums become detached from the bone, and pus finds an outlet from between them. In necrosis of the lower jaw the pus frequently penetrates the tissues covering the bone and points upon the under surface of the jaw; at other times the pus may follow the intermuscular connective tissue of the neck, and point as low down as the clavicle or breast. The necrosis may also extend to bones of the face and head. The necrosed portion of bone becomes a foreign body which the surrounding tissues endeavor to extrude, or to wall off and surround, owing to the presence of granulation tissue, which gradually perforates the surrounding bone at places of least resistance, the result being the formation of one or more sinuses, through which the dead portion can be withdrawn with little trouble. Separation finally takes place between the living and dead portions of the bone. While this is taking place, a quantity of new bone, especially in the case of necrosis of the lower jaw, is forming around the sequestrum; the new osseous tissue is called the "involucrum," which it is necessary to at least partially remove before the sequestrum can be withdrawn.

Treatment.—The treatment of necrosis of bone consists in the removal of the dead portion (sequestrum), and the restoration of the parts to a condition favoring regeneration. The removal of the sequestrum or dead portion is accomplished with bone-forceps and chisels, and all the lining material of the cavities which the fragments have occupied should be scraped away with

a sharp spoon. The cavities are then packed with iodoform gauze soaked in a mixture of balsam of Peru, containing ten per cent. of guaiacol. Before the sequestrum or dead fragments separate from the living bone, no attempt should be made to remove them, but the suppurating surfaces should be frequently irrigated with antiseptic solutions. The fetid odor of the breath may be corrected by freely using a solution of permanganate of potassium and cinnamon: also the fetid odor of the discharges. The treatment of Phosphorus-necrosis and other toxic forms, consists in the use of antiseptic solutions, the opening of abscesses, and the removal of diseased bone, and especially of dead bone upon the first provocation. The constitutional treatment in all forms of necrosis should be supporting, and liquid foods given where there is inability to open the mouth. Such tonics as iron, quinine, cod-liver oil, malt extracts are indicated, together with change of air. (See *Arsenical Necrosis.*)

Caries of Bone.—Caries affecting bone is a chronic inflammation, with rarefaction or absorption of bone-tissue attended by suppuration; it is molecular death of bone, being a disintegration of the tissue. Both necrosis and caries of bone bear the same relation to the osseous tissue that gangrene and ulceration do to the soft tissues. When percussion is made a different sound is distinguished between necrosis and caries of bone, owing to the difference in the degree of density. The probe reveals a sharp sound in the case of necrosed bone, owing to its hardness, while the use of this instrument reveals a dull sound in the case of caries of bone, and the probe also penetrates the diseased structure.

The causes of caries of bone depend upon a chronic inflammatory condition generally due to tubercular or syphilitic infection. Among the bones most frequently attacked are the bones of the face, and the lower jaw, especially the latter. The syphilitic form most commonly affects the bones of the nose and palate. When carious bone is exposed, it is found to be softened and disintegrated, and portions have been removed by liquefaction or absorption, leaving a greater or less cavity, the surface of which is covered with granulations and pus. Among the granulations may be found small spiculæ of dead bone, surrounded by pus. In caries of bone resulting from syphilis, ulceration destroys the

external surface of the bone, leaving a granulating surface, discharging the gummy pus.

Treatment.—The treatment of caries of bone consists in removing the carious portion with the bone-chisel and sharp spoon and disinfecting the entire tract with hydrogen peroxide or caustic pyrozone, then packing the wound with iodoform gauze, soaked in a mixture of balsam of Peru containing ten per cent. of guaiacol. The constitutional treatment consists in the giving of tonics, such as iron, quinine, cod-liver oil, and malt extracts, and nourishing food.

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

In most acute diseases there is a tendency to recovery after a certain time has elapsed, in case there is no failure in the functions of any of the essential organs; hence, in all acute diseases, the state of the nervous system should be carefully watched.

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

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

There are also morbid states not necessarily dependent on organic disease. Various acids are produced by the fermentation of substances containing starch or sugar, and there is reason for believing that an increased secretion of acid may take place from the mucous membrane of the stomach and produce symptoms of acidity independently of fermentation, although one of the properties of the gastric fluid is to prevent fermentation. The symptoms of acidity are a sour taste, and the occurrence of acid eructations, often accompanied with heartburn, and sometimes with diarrhœa, and a feeling of sinking at the epigastrium.

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

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

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

IMPORTANT POINTS IN DIAGNOSING AFFECTIONS OF THE MOUTH, WITH A SYNOPSIS OF TREATMENT.

The Periods of Eruption of the Deciduous Teeth.—The deciduous teeth begin to erupt about the seventh month after birth, and this dentition is completed about the twenty-fifth to the twenty-eighth or thirtieth month. Some children are born with erupted teeth, while others may not begin to erupt their teeth until twelve months or more of age.

A Normal Dentition is attended with slight local disturbances, and the resorption of the overlying tissue indicates at the point of the advancing crown, a mild non-septic inflammation, the gum showing a somewhat deeper color, with a slight increase of temperature.

Pressure affords relief and reduces the hyperemia, which accounts for the tendency of the child to bite upon hard substances, especially cold ones. There may also be a stimulation of the salivary glands, shown by an increased flow of saliva.

An Abnormal Dentition is indicated by a hot, dry mouth, swollen, tense, tender and shining gums, thirst, fever, disordered bowels, offensive motions, diarrhœa, convulsions, and other serious results, fretfulness, refusal of nourishment, eruption on skin, troublesome cough, convulsions.

Convulsions of Dentition are indicated by such premonitory symptoms as irritable temper, unusual brightness of eyes, indisposition to eat or sleep, slight involuntary movements of muscles of face, or extremities, grinding of teeth. The paroxysm is indicated by rigidity of body, utterance of a cry, face turning red or purple, veins of neck turgid, suspension of respiration, loss of consciousness, irregular and intermittent contractions of muscles, protrusion of tongue, frothing at lips, distortion of face, rolling of eyeballs, contracted and rapid pulse.

Treatment.—For the relief of the premonitory symptoms of dentition, bromide of potassium in doses of gr. iij to v, according to age, every ten minutes. Demulcent and soothing lotions to the gums. An aperient if no diarrhœa is present. For more decided symptoms, scarification or lancing of the gums. An enema of soap and water to relieve the digestive canal of irritat-

ing substances, or the use of the following combination to abate the fever and allay the irritability of stomach and bowels:—

℞ Potass. bromidi pulv. . . . . gr. xv
Potass. nit. pulv. . . . . gr. xij
Zinci oxidi . . . . . gr. ij M.
Divide in chart. No. VI.
Sig.—One powder every four hours, until bedtime.

For the diarrhœa: change the diet, adopt hygienic measures; mild purgatives in small doses. For acid dejections, calcined magnesia; or small doses of sulphate of magnesia and tincture of rhubarb; or of pulv. ipecac., pulv. rhubarb and bicarbonate of soda; or castor oil in doses of ℥ss. For infancy diarrhœas Dr. Thomas claims excellent results from the following mixtures in gastric or gastro-intestinal dyspepsia, characterized by nausea, vomiting, flatulence and diarrhœa with non-slimy, fetid, yellowish or greenish stools. ℞. Lactic acid, ℥j: simple syrup, ℥v; water, ℥iijss. M. Sig.—One drachm every quarter to half hour after meals. (See Dr. James W. White's recipes under opium, chloroform, aromatic sulphuric acid; and also under bromide of potassium.)

For convulsions: the administration of an anæsthetic to abort or control the spasmodic movements; hydrate of chloral, gr. v to x, according to age, dissolved in two or three drachms of water, and injected into the rectum; or the administration of bromide of potassium; use of hot foot bath, to which is added a small quantity of mustard; the warm bath; and when cerebral congestion is threatened, cold applications to the head.

A severe local inflammation may be relieved by a thorough lancing of the gums—an operation which may prevent more serious complications. It is performed by making an incision with a sharp-pointed bistoury, and dividing the gum lineally over the incisors and cuspids, and crucially over the molars. The point of the blade being inserted deep enough to touch the enamel surface of the tooth. A little powdered tannin or powdered alum may be applied to the incisions, either of which generally arrests any undue bleeding.

According to Dr. A. Brothers: 1. Dentition is rarely, if ever, a direct cause of death.

2. Precocious or retarded dentition may occur in otherwise healthy children or in entire families.

3. The period of eruption of the first teeth occurs, in healthy, breast-fed children, at six and a half months in the vast majority of cases, and first dentition is usually complete at thirty months.

4. Dentition is distinctly retarded in the first as well as the later teeth in children brought up on a mixed or artificial diet.

5. Congenital diseases—tuberculosis, syphilis, endocarditis—seem to have a retarding influence on dentition.

6. Rachitis has a very pronounced retarding influence on the whole course of dentition.

7. Scrofulosis seems to hasten the eruption of the first teeth, but does not affect the later teeth.

8. In cases of undeveloped brain—idiocy—there is a marked retardation during the entire period of dentition.

9. Chronic diseases have a retarding power over the first teeth, but do not seem to influence the later teeth.

10. Children suffering from marasmus seem to be precocious with the first teeth, but delayed with the later teeth.

11. Cases of epilepsy, developing in early infancy, seem to have their first teeth appear early.

Hemorrhage after Extraction of Teeth.—Remove loose clot, wash out cavity with *hot* water; then plug cavity with iodoform gauze; or, cotton dipped in mastic, and rolled in tannin; or, cotton saturated with oil of turpentine; or, ferric alum; or, cotton saturated with phenol sodique, and then dipped in tannic acid; or, antipyrine on cotton; or adrenalin chloride solution; or the 25 per cent. ethereal solution of hydrogen dioxide in small quantity on cotton. The preparations of iron and nitrate of silver are considered objectionable as styptics on account of the clot formed by them being soluble in the blood, and also on account of the escharotic action of the nitrate of silver. Internally: Administer three grains of tannic acid dissolved in two-thirds of a tumbler of water, of which two teaspoonfuls are given every five minutes until three doses have been taken, after which give the same quantity every fifteen minutes. Gallic acid, ergot, or oil of turpentine, may also be given internally, especially when the hemorrhage is indicative of some constitutional vice. In addition, upright posture, and a cool apartment.

The After-pains of Tooth Extraction.—When due to pericementitis, or any form of septic infiltration, it may be relieved by filling the vacant cavity with a pledget of cotton saturated with a solution composed of glacial carbolic ℥j, liq. potassæ ℥j, and water ℥viij; also by filling the vacant cavity with powdered orthoform directly after the removal of the tooth. A single drop of nitroglycerine, one per cent. solution, *in half a glass of cold water* is also recommended. The careful inhalation of one or two drops of amyl-nitrite for three or four seconds, followed by complete rest for five minutes, is also recommended. Also, locally, Fletcher's carbolized resin, composed of resin, carbolic acid, and chloroform, which is a good styptic also; or, chloroform one part, and tincture of pyrethrum three parts.

Pericementitis, or Peridontitis—Inflammation of the Peridental Membrane—is indicated by a sense of uneasiness and fullness, which is at first relieved by pressure, but, after active inflammation is established, pressure on the affected tooth causes intense pain, of a dull, heavy, annoying character. The tooth is also protruded, to a slight degree, from the alveolus, and also somewhat loosened, owing to the thickening of the investing membrane; and the inflammation, which is at first manifested by a red line near the margin of the gum, becomes general over the entire root, sometimes involving the neighboring gum, and even the palate and cheek, and symptoms of febrile disturbance. In extreme cases the temperature may rise to 105° F., and subsequently septicemia, or pyemia and death may ensue. If not arrested, a suppurative condition, alveolar abscess, ensues. A modification of the symptoms just enumerated, the tooth being tender to pressure, more or less raised in its cavity, and surrounded by a reddened and swollen gum, with a varying amount of pain, and the discharge of pus from around the neck of tooth, or from a fistulous opening in the gum, and such symptoms continuing for a long time, indicate the chronic form of an advanced state of periodontitis, which often results from systemic influences. The common cause of severe cases of pericementitis is the entrance of pyogenic organisms from the pulp-canals of teeth into the tissues of the apical space and into the lymphatics.

Treatment.—Remove all irritants; apply counter-irritants, such as equal parts of tinct. iodine, tinct. aconite, tincture of cannabis

indica, and compound tincture of benzoin; or cantharidal collodion; or iodine and creasote, or carbolic acid; or capsicum in form of tincture, or in small bags of the powder to surface of gum over root of affected tooth. Depletion by the lancet, leeches or cups. Hypodermic injection of morphine, or tinct. of opium. Application of spray of rhigolene or absolute ether until gum is blanched. To relieve the pain, the following method is recommended: Adjust the rubber dam; sterilize the teeth included in the dam with a 3 per cent. solution of pyrozone; then use absolute alcohol to dehydrate the tooth structure; apply oil of cloves by means of a pledget of cotton on a broach, or eugenol in same manner; then apply another pledget of cotton saturated with the same agent as before, which is permitted to remain in the cavity, and this cotton by means of warm air made perfectly dry; this process is repeated several times and the pledget of cotton finally sealed in the cavity. A liniment composed of menthol, chloroform, and tincture of aconite is of great benefit after the applications of counter-irritants, such as capsicum plasters, cantharidal collodion, iodine and aconite, etc. Disinfecting the root canals, after the removal of a decomposed or dead pulp, by means of disinfectants and antiseptics, viz.: peroxide of hydrogen, or pyrozone, in three, or five per cent. solutions or fifty per cent. solution of peroxide of sodium, used alternately; also, by the cataphoric current with solutions possessing the requisite conductivity, such as a saturated solution of iodide of potassium to which is added about one-fifth its quantity of a mixture of equal parts of the tinctures of iodine and aconite. Constitutional treatment: Saline cathartics; bromide of potassium, gr. xxv, combined with gtt. v of tinct. veratrum, every four hours; or bromide of potassium alone, in doses of gr. xxv or xxx; or hot water applications to face and neck, and calcium sulphide in 1/10 gr. pill until eight have been taken in two hours, then one every half-hour for two hours; or, drachm doses of fluid extract of gelsemium, minims x, water ℥j, every fifteen minutes until four doses have been taken, then every half-hour for two hours. Sulphate of quinine gr. viij combined with sulphate of morphia gr. 1/8 and patient placed in bed with the head elevated. If pulse is full and throbbing, tincture of aconite ten drops in one ounce of water, and tea-

spoonful doses given every hour until the pulse becomes normal. If the inflammatory symptoms are not relieved in five hours, the feet are to be placed in hot water, and then wrapped in blankets, and x gr. of Dover's powder in hot lemonade given until free diaphoresis occurs. The tooth protected from irritation during treatment, by a cap over adjoining teeth. The removal of the extremity of the root of a tooth affected with chronic periodontitis by means of a trepan has also been suggested.

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

The characteristic pain of an alveolar abscess is deep-seated and throbbing, and, with the swelling, denotes the formation of pus. *A chronic form of alveolar abscess* is indicated by a subsidence of the active symptoms, and a continuance of the discharge of small quantities of pus through a fistulous opening opposite the root of the affected tooth, or about its neck. An elastic fluctuating swelling in any part of the face, or for some distance down the neck, may result from abscessed teeth.

Treatment.—Remove all irritants. Give free vent for the escape of the pus. Destroy sac of abscess by therapeutic treatment, or by a surgical operation. Therapeutic treatment: First cleanse the root-canal by injections of chloride of sodium or peroxide of hydrogen, or 3 per cent. solution of pyrozone, or peroxide of sodium; escharotics to destroy the sac, such as creasote, carbolic acid, salicylic acid, nitrate of silver, argyrol, iodine, dilute aromatic sulphuric acid, to which, in chronic cases, add tinct. of capsicum; also antiseptics: bichloride of mercury, chloroform and aristol, also oil of cassia and oil of gaultheria, in combination with carbolic acid, kalium-natrium. Sodium peroxide twenty-five to fifty per cent. solution, or pyrozone twenty-five per cent. ethereal solution, may be employed to secure the thorough sterilization of the dentine of the root,

followed by an antiseptic, such as Black's 1, 2, 3 mixture; the pulp-cavity may first be washed out with the three per cent. solution of pyrozone by means of a syringe and dried, when the fifty per cent. solution of sodium peroxide is worked into the canals with a fine smooth platinum broach, and a continuation, after drying the cavity, of the application of the sodium peroxide, until the saponifying action ceases. The abscess cavity should be packed with antiseptic gauze to promote or stimulate granulation, and the quantity of gauze gradually reduced as the cavity is healing. The surgical method consists in gaining access to the sac, by means of a bistoury or small trephine, through the fistulous opening, where such exists, and detaching and breaking up the sac by means of suitable nerve instruments and the application of escharotic agents. Liquid air applied intermittently in the form of spray, has been successfully used as a local anæsthetic in opening abscesses. Dr. Brophy, speaking of cases of alveolar abscess where the disease is in the bone, says: "In such cases if the treatment is simply opening into the tooth for drainage with the expectation that nature will effect a cure, we will be disappointed. In such cases an incision should be made down to the diseased bone, packing it with iodoform gauze, or boracic acid gauze. The next day with a bur cut off the affected portion of the roots of the teeth because they are a source of irritation; then with a bud-bur pass over the bone, and remove the dead portions, and again pack the wound with antiseptic gauze. In a day or two make an examination, and if healthy granulations are beginning, insert a wax plug, which is not permeable like the gauze, to prevent the wound from closing, and the consequent trouble from confined pus."

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

Treatment.—Make a free incision in the gum opposite and near the apex of the root of the affected tooth. Apply to the surface of the threatened point of exit of the pus, alcohol, or spirits of camphor or paint with collodion, and make gentle pressure by means of a compress of sheet lead or sheet tin, or pads and bandage, to change the direction of the pus.

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

Treatment.—Make an opening into the antrum, either through the alveolar cavity of one of the roots of a superior first or second molar, or through the process between the roots of the first and second molars, which is the most dependent portion of the antral cavity, with a suitable trephine, and thoroughly wash out the cavity with a warm injection of salt ℥j to water Oss, and if there is an offensive odor, syringe with a solution of permanganate of potash; then dress daily with a solution composed of carbolic acid one part, and oil of sweet almonds fifteen parts, applied on cotton secured in the cavity. If no improvement, then syringe the antrum with a solution consisting of carbolic acid ℥j, tinct. iodine ℥j, iodide of potassium gr. xv, water ℥ viij.

Where a more powerful stimulant is required, use an injection of zinc, gr. x to the ounce of water. For systemic treatment, administer sulphide of calcium in the form of one-tenth of a grain pill three times a day after meals, doubling the dose if necessary. (*Dr. Frank Abbott.*) When an opening has been made into the antrum, sufficiently large to admit the little finger, the following treatment has proved effectual; syringe first with a warm solution of chloride of sodium, after which inject diluted peroxide of hydrogen, increasing the strength of the solution gradually if necessary, until the pus has ceased discharging; after this a solution of boric acid or listerine may be used. The injection of peroxide of hydrogen into the antrum through a small opening is not justifiable owing to its effervescent action on the pus. Dr. F. D. Weisse recommends injecting the antrum at least five times a day with a solution of hyposulphite of soda, one drachm to one ounce of water. Dr. J. S. Marshall recommends as a wash for the antrum, boracic acid twelve parts, salicylic acid four parts, water one thousand parts; iodoform, iodol, aristol, pyoktanin, sulphonal and boric acid, in form of powder, are also recommended. M. Emile Denis recommends syringing out the cavity twice a day with a sixteen per cent. solution of boricine (see boricine), and then applying about a teaspoonful of the powdered boricine.

Diagnosis of Antral Diseases.—Transillumination by means of an electric mouth lamp of 20 volts through the cheek, the patient being seated in a dark room. A clear pinkish illumination is a sign of health; engorgement by pus or mucous is shown by opacity; the presence of a tumor is indicated by the light being entirely obstructed. The X-rays and skiagraphy are also valuable aids for diagnosis.

Alveolar Ulceration is distinguished from alveolar abscess by the presence of an ulcerated surface of peridental membrane instead of pus contained in a fibrous sac, the purulent matter in alveolar ulceration oozing out through the gum or around the neck of the affected tooth: no new tissue is formed, as in the case of abscess; but the normal tissue is disorganized and wasted, and the matter discharged is watery, translucent, and may be in some cases odorless, while that from an abscess is thick, opaque and offensive. Ulceration causes little or no swelling, and the

inflammation is phagedenic in character, destroying hard and soft tissues by chemical decomposition. Like alveolar abscess, it may be due to the death of the pulp, and it may begin as abscess, not being a primary disease, but always preceded by some other well-established and usually chronic affection. In alveolar ulceration a considerable portion of the peridental membrane is destroyed, and there is a wasting away of the alveolus and cementum in the region of the ulcer, whereas in alveolar abscess the peridental membrane may remain in an inflamed and morbid condition and the alveolar walls firm and penetrated at one point to permit of the escape of the pus. In long-continued alveolar ulceration, as a result of the disease, calcareous deposits, in the form of granules, collect on the root from the ulcerated area to the margin of the gum.

The treatment consists in the thorough removal of the calcic deposit when present, and the scraping of the root of the tooth over the entire ulcerated surface, and the application of antiseptic and astringent remedies, such as listerine, aromatic sulphuric acid, etc.

Maxillary Abscess may be due to caries or the diseases of the teeth, or to pathological changes occurring in the structure of the bone itself.

Treatment.—The treatment of maxillary abscess consists either in puncture or incision, and the extraction of one or more of the teeth if they are found to be connected with the origin of the disease. If free drainage be established by an early incision, the arrest of the disease is practically secured: it is sometimes necessary to remove a portion of the alveolar process. The presence of dead bone should be determined, and such removed, with other offending matter Free drainage should be maintained until complete recovery is brought about. The abscess may be opened under cocaine anæsthesia, a soft rubber drainage tube be inserted, and the cavity thoroughly irrigated and disinfected with a 1 to 2,000 bichloride of mercury solution. A safety pin may be placed at the external end of the tube, and a strip of iodoform gauze put between it and the skin; over this the ordinary bichloride gauze dressing may be secured by a roller bandage.

Arsenical Necrosis of the Alveolar Process indicated by a dark purple and swollen condition of gum, with offensive purulent dis-

charge from one or more fistulous openings, or from between the gums and the teeth. The gum becomes soft and spongy, very sensitive, bleeds readily, and loses its connection with the necrosed bone beneath. Arsenical necrosis generally results from the careless application of arsenic to the pulp of a tooth in endeavoring to devitalize it.

Treatment.—Dialysed iron or, what is claimed to be better, the fresh ferric hydrate; another remedy is the tincture of iodine, scarifying the gum previous to the application of any of these agents.

As a precaution against arsenical necrosis it is suggested to bathe the gum tissue about the tooth into which arsenic is to be introduced with Weld's syrup of chloride of iron, using it on a pledget of cotton which is first saturated with the iron and then dipped into bicarbonate of sodium. The combination is applied around the tooth and between the adjoining teeth, and renders inert any excess of the arsenic which may come in contact with the gum.

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

Treatment.—Removal of patient from exposure to fumes of phosphorus, and the excision of diseased portions of bone; the subsequent treatment being that for Necrosis of Bone.

Fracture of the Alveolar Process is indicated by a swollen, red and painful state of gum and tissues covering maxillary bone,

occurring some days after the receipt of the injury, and, if neglected, may result in necrosis of the body of the bone.

Treatment.—Antiphlogistic lotions, to reduce the inflammation, such as—

℞ Plumbi acetatis . . . . . ℥j
Tinct. opii . . . . . ℥ss
Aquæ . . . . . ℥viij or x. M.
Sig.—Apply on lint.

Remove any detached portions of process, and secure loose teeth with waxed sterilized ligatures.

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

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

Treatment.—Discontinue use of mercury. Chlorate of potash, internally, gr. x, in water ℥ss: as a gargle, ℥j, to water ℥j; or iodide of potassium in doses of gr. iij, three times a day. To correct fetor of breath, permanganate of potash solution, gr. ij to x, to the ounce of water; or washes of chlorinated soda; astringent washes during convalescence. Loose teeth should not be removed, as they will again become firm.

As a wash

℞ Tinct. myrrhæ . . . . . f. ℥iij
Potassii chloratis . . . . . ℥ss
Sodii chloridi . . . . . ℥ij
Aquæ dest. . . . . q.s. ad f. ℥viij. M.

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

Treatment.—Administration of iodide of potassium in gr. iij doses four times a day, after meals, to eliminate the lead; saline cathartics, electricity, strychnine, etc., for the paralysis, and tonics, such as quinine, to promote the strength.

Scurvy is indicated by a general spongy condition of the gums,

and, in severe cases, intense fetor, ulceration and sloughing together with constitutional symptoms of an aggravated character. The premonitory symptoms in the mouth are, gums, paler than usual, with a slight tumid or everted line on free margins, and a slight tenderness on pressure; breath offensive, and a disagreeable taste; tongue flabby and larger, though clean and pale. Later, the gums become darkened in color, inflamed, swollen, spongy, bleed readily, and finally separate from the teeth. The gums of edentulous jaws do not present these symptoms. At length, the gums present great, fungous, lacerable excrescences, which are prone to suppurate and become a brown, fetid mass, with a very offensive odor. The salivary glands become enlarged and swollen; tongue indented by the teeth, which latter become coated with a salivary deposit, and finally drop out. Necrosis and extensive exfoliation of the bones of the jaw may occur. Some varieties of salivary calculus will produce similar local symptoms, especially when the general condition of the system is unfavorable.

Treatment.—Change of diet, substituting fresh meats, soups, nitrogenous food, and vegetable acids, lemon-juice, lime juice, citric, tartaric, and acetic, and these combined with potassium. Nitrate of potassium, either alone or mixed with vinegar, as an anti-scorbutic. Arsenic and iron are of service in most cases also rest and quiet.

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

Treatment.—Emollient and detergent lotions, such as slippery-elm bark, pith of sassafras, or borax, ℥j, glycerine, ℥j, or, borax, ℥j, honey, ℥iij, or a weak solution of alum, or acetate of lead, gr. iij to the ounce of water. A few doses of bromide of potassium will relieve the nervous excitement. Chlorate of potash lotion, gr. v to the ounce of water, is also efficacious as a local remedy. This affection usually subsides as soon as the constitutional disorder is relieved. A mild cathartic and attention to the diet may be all that is required.

Freely spraying the mouth with a 3 per cent. solution of peroxide of hydrogen, followed by a spray of potassic chlorate (gr. xx–℥j) will usually afford prompt relief.

Suppurative Gingivitis.—Dr. Ottolengui recommends for this affection spraying the gingivæ with a three per cent. solution of pyrozone; then remove all deposits thoroughly; for virulent cases he employs a five per cent. solution, and sometimes a twenty-five per cent. solution. Pain following the application of the pyrozone may be relieved by applying glycerole of tannin. This treatment is to be resorted to twice a week, using the three per cent. solution of pyrozone as a mouth-wash during this time. Where sensitiveness about necks of teeth or elsewhere is caused by the one-twentieth of one per cent. of acidity of the pyrozone, it may be neutralized by placing a small particle of carbonate of magnesia in the tumbler, and then pouring in the three per cent. solution of pyrozone to be used. Argyrol has a very beneficial effect, and has almost superseded the use of silver nitrate in suppurative conditions; in virulent cases it is used in solutions of 25 to 50 per cent. in other cases in solutions of 10 per cent.

Catarrhal Stomatitis is indicated by undue redness and capillary congestion of the mucous membrane, with engorgement and swelling of the mucous follicles, swelling of the tongue, gums, cheeks, and lips, fetor of breath, heat and dryness of mouth, and in some cases this is followed by excessive secretion of saliva and mucus, when the gums often become soft and spongy, and bleed easily. Vesicles sometimes appear on the tongue, lips, and cheeks, which leave minute ulcers, with a yellowish centre, and red margin. Fissures may form at angles of mouth, and upon the lips, with exudation and the formation of crusts; but the pain is not generally severe. The constitutional symptoms are fever, diarrhœa, thirst, loss of both appetite and sleep.

Treatment.—Correcting the gastro-intestinal derangement by castor oil, rhubarb, or rhubarb combined with carbonate of soda; attention to the milk, the use of a mild antiseptic solution as a mouth-wash, chlorate of potash solution, or a weak solution of sulphate of zinc or copper. Lime water added to the milk, and a hygienic condition maintained. The following is very serviceable:

℞ Potassii chlorat. . . . . ℥j
Tinct. myrrh. . . . . gtt. xx
Elixir calisayæ . . . . . f. ℥iij. M.
Sig.—Internally, a teaspoonful in water every four hours.

Locally;

℞ Sodii boratis. . . . . gr. xxx
Mel. purificati . . . . . f. ℥iij
Aquæ q. s. ad. . . . . f. ℥iij. M.

Sig.—To be used as a mouth-wash every four hours, or on a swab.

Peroxide of hydrogen ℥j water eight ounces, is also valuable as a mouth-wash.

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

Treatment.—Remove all apparent causes of irritation by correcting the bad condition of health. Change diet and residence, if at fault, observe cleanliness, administer stimulants and tonics, as liquor ferri nitratis with tincture of calumba, etc. Local applications of nitrate of silver, gr. j to iij to the ounce of water, or diluted muriatic acid, alternating with a lotion of equal parts of borax and honey, or chloride of lime, ℥j, honey ℥j; also, pyrozone three per cent. europhen combined with lanolin, phenosalyl, glycozone, etc. Chlorate of potash internally, in doses of ℥ij or iij, and also as a lotion, is efficacious; also, a strong solution of borax, in obstinate cases, gr. xv to the ounce of water; also, a solution of sulphate of copper; painting the ulcers with tincture of iron and glycerole is also beneficial. A wash composed of mercuric chloride in peroxide of hydrogen (1 to 2000) is very effective.

Ulcers of the Mouth due to Syphilis are indicated when such

ulceration is obstinate under any but specific treatment, and when accompanied by symptoms peculiar to syphilis.

Treatment.—Constitutional treatment with mercury or iodide of potassium, and such local remedies as are employed in ulcerous stomatitis.

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

Treatment.—(See Ulcers of the Mouth due to Syphilis.)

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

Treatment.—Preventive: Pure air, cleanliness, nourishing diet, sulphate of quinine, internally, in doses of gr. ij to iij; and as a lotion, sulphate of zinc, ℥j to the ounce of water. When the disease is established, the local use of escharotics—as acetic, sulphuric, nitric, hydrochloric acids, nitrate of silver, acid nitrate of mercury, or chloride of antimony—each applied by means of a camel-hair brush to gangrenous part, and at once followed by the application of dry chloride of lime. The mouth to be washed out with tepid water, by means of a syringe. After the separation of the slough, the dry chloride of lime alone may be used. The muriated tincture of iron is also employed; and after the gangrene is arrested, astringent and antiseptic lotions are efficacious.

Scrofula.—In early life the characteristics are most apparent. Tendency to enlargement of lymphatic glands; proclivity to certain forms of skin eruption; to disease of the joints and bones; the efforts necessary for growth and development overtax the defective vital powers; defective quality of the blood and tissues, and especially of the vascular tissue; injuries, such as sprains, end in chronic disease of the joint. A scrofulous child may grow finely for several years, and then, without adequate cause, be overtaken by meningitis or disease of vertebræ; inflammations are prone to take on chronic form.

Treatment.—Pure air of country, cod-liver oil and malt, iron and hypophosphites to increase the quantity of nutritious constituents of the blood.

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

Treatment.—Removal by a surgical operation.

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

Treatment.—Removal by a surgical operation, and the application of escharotics, as chromic acid, or chloride of zinc, etc., to prevent its reproduction.

A Dentigerous Cyst.—Cysts of the teeth are of two kinds—those connected with the roots of developed or eruptive teeth, and those connected with imperfectly developed or unerupted teeth, and both varieties are common to either jaw; the latter, however, are known as "dentigerous cysts." A dentigerous cyst is indicated by the expansion of the bone of the jaw at some particular spot, with disfigurement of the adjacent parts; a sense of weight and tension in the affected part; in some cases, constitutional irritation from pressure; pressure producing a parchment-like crackle or crepitation; absence of a tooth, which has never been erupted nor extracted. Heath remarks that "the clinical history of cysts connected with the teeth is that of painless expansion of the alveolus of either jaw, but more frequently of the upper, with crackling of the bone on pressure, and ultimate absorption of the bony wall. The cyst then pre-

sents a bluish appearance through the distended mucous membrane, and if large, gives distinct evidence of fluctuation."

Treatment.—A free incision, and the removal of the unerupted tooth by destroying the front wall of the cyst, and the cavity filled with antiseptic gauze or lint, so as to induce granulation and gradual obliteration. In the case of a cyst of the lower jaw, after the removal of the contents and a portion of the wall, the plates of bone should be pressed together as much as is possible.

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

Treatment.—Extraction, by first making an incision through the mucous membrane, and then exposing the tooth by the removal of its bony capsule and the application of the elevating forceps or a suitable elevator.

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

Treatment.—Remove the dead portions from the living bone. Syringe with peroxide of hydrogen, or caustic pyrozone, to cleanse the part, and use chlorinated washes, such as chloride of soda or permanganate of potash, to correct the offensive odor and disagreeable taste. Make daily applications of dilute aromatic sulphuric acid, adding to the acid a few drops of the tincture of capsicum for its stimulating effect; diluted carbolic acid, tincture of iodine and chloride of zinc, sulphate of copper, listerine and ethereal solution of iodoform, aristol, etc., are also used as applications. Support the strength by stimulants, tonics, and nourishing diet. For a dead bone solvent, wash out the sinus with peroxide of hydrogen, and inject into it the following, twice a day, so that it will come in contact with the dead bone: Pure

scale pepsin, ℥ss; nitro-muriatic acid, ℥j; distilled water, Oj. (See Necrosis and Caries of Bone.)

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

Treatment.—Reduction is made by placing the thumbs, protected by napkins, as far back upon the molars as possible, and then depressing the back part of the jaw, and at the same time raising the chin. The jaws should afterwards be secured by a bandage extending under the chin and over top of head.

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

Treatment.—Reduce by bringing the displaced portions into apposition, being guided by the arch of the teeth, and then securing them by wire, silk, or waxed sterilized ligatures around the teeth, and introducing an interdental splint.

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

Treatment.—When the cleft is confined to the soft palate, the operation of staphylorraphy may be performed; when, however, the cleft is through both soft and hard palates, the construction of an artificial obturator and palate combined will often prove

successful in correcting the voice and preventing much inconvenience in partaking of food and drink.

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

Treatment.—Pare the surfaces of the edges of the fissure in such a manner as will allow a flap on one to cover the edge of the other when they are brought in apposition, when they are secured by the aid of pins and the figure-of-eight suture, which, in the case of infants, may be preserved from injury by passing a silver wire through the cheeks, having on each protruding end a button, to prevent the breaking up of the suture during the act of crying. Cocaine is a useful local anæsthetic for such operations.

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

Treatment.—Electricity, and systematic treatment with strychnine, phosphorus, iron, quinine, ergot, etc.

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

Treatment.—Remove either by the snare or by torsion, or by repeated applications of chromic acid. To prevent reproduction apply to the surface chromic acid or chloride of zinc.

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

Treatment.—Change of diet and residence, if these are at fault; the administration of saccharate of lime in milk. Local treatment, mel-boracis, or borax solution, or—

℞ Sodii borat. . . . . ℥j
Glycerinæ . . . . . ℥ij
Aquæ . . . . . ℥iv. M.

Sig.—Apply with a camel's-hair brush four or five times a day.

Or—

℞ Zinc sulph. . . . . gr. i–iv
Aquæ rosæ . . . . . ℥ ij. M.

Or patches touched with a weak solution of nitrate of silver; in severe cases gr. v to water f. ℥j. A dose of castor oil or calomel to clear the alimentary canal, small dose of chlorate of potash,—a few grain three times a day, attention to diet.

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

Treatment.—Demulcent applications, such as mucilage of gum acacia, or flaxseed. Mel-boracis or a solution of boric acid in glycerole, applied with a camel's-hair brush. In more obstinate cases touch the patches with a solution of nitrate of silver—gr. v to f. ℥j of water. For constitutional symptoms, administer laxatives and the bromides, with warm foot bath.

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

If it is firm in texture and slow of growth, the epulis is generally fibrous; but if rapid in growth and dark in color, it is myeloid; if prone to ulcerate and very painful, it may be an epithelioma.

Treatment.—Removal of the growth, and its reproduction prevented by the application of nitrate of silver, or chromic acid, or a fire cautery. Generally it is necessary to remove the periosteum and a thin scale of the bone beneath, as this growth is connected with the periosteum. Extract all roots of carious teeth, and when the epulis is connected with the alveolar cavity of a tooth and has tendency to the interior of the jaw, it is generally myeloid, and several teeth will have to be sacrificed, so that the alveolus can be thoroughly excavated. When very extensive, a

considerable portion of the alveolus and bone of the jaw must be removed.

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

Epithelioma of the gum is in the form of a ragged ulceration, often the result of irritation from diseased teeth; the pain and inconvenience at first slight; a tending of the ulceration to spread towards the tongue and cheek, with induration of the base of the ulcer.

Treatment.—Removal as soon as its nature is manifest. In slight or doubtful cases the application of the strongest nitric acid, the acid nitrate of mercury, or the actual cautery, to bring about a healthy cicatrization. If the disease has involved the alveolus, as is evident by the swelling of the gum and the looseness of the teeth, a free removal of the bone is necessary.

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

Treatment.—Remove all dead teeth and salivary calculus. Remove the morbid growth by a horizontal incision through the diseased structure to the crowns of the teeth, and freely scarify the gums by passing a lancet between the teeth to the process, and repeat this operation at intervals of four or five days, if necessary. Use detergent and astringent and antiseptic lotions and mouth-washes, and occasionally a weak solution of nitrate of silver. Phenate of soda is efficacious as a lotion, it is also antiseptic. Diet non-irritating, and all excess and intemperance avoided. The teeth should be kept perfectly clean. Trichloracetic acid to dissolve calculus.

Alveolar Pyorrhœa, is indicated at first by an uneasy sensation; then inflammation of margins of gums; looseness of the gums about the teeth, which form pus-pockets; and necrosis of edges of alveolar process; a tendency to hemorrhage; inflammation extending deeper into gums; small sulci filled with pus; looseness of the teeth and change of positions; disagreeable taste; peculiar

fetor of breath; dark livid color of gums, with thick margins, and often extreme sensitiveness to touch; in some cases the gums are denuded of their epithelium, with a polished appearance, in others, with a pimpled surface; the teeth, at length, held in their cavities by a tough, ligamentous attachment,due to the degenerative change occurring in the peridental membrane.

A simple form of this disease may manifest itself at the margin of the gum, indicating its presence by a congested appearance, beneath which may be found a granule of calcified material. While in many cases there is general congestion of the affected gum, and a proneness to hemorrhage, in other cases the gum may present an anæmic appearance—pale and bloodless. This disease may also be associated with syphilis, mercurial salivation and scurvy. The deposit of salivary calculus or other calcified substance is supposed to be secondary to the disease, as a deep-red and denuded gum tissue about the necks of the teeth may be present without any deposit.

Dr. Charles B. Atkinson describes this affection as follows: "Perhaps the earliest condition presented to us is a tumefaction of the margin of the gum—from pearly-red and light lilac to purplish-blue in tint—sometimes puffing to such an extent as to be easily confounded with an alveolar abscess. The tumefied gum bleeds readily on brushing. A probe passed carefully under the gum will disclose a pocket embracing more or less the circumference of the root, in some places nearly or quite to its apical end. Sometimes the gum will be found receded, perhaps on one side only. A purulent discharge more or less marked, may be demonstrated by pressure of the finger over the root, from its end towards the crown of the tooth. A further demonstration of the presence of pus may be secured by injection, about the necks of the teeth, of peroxide of hydrogen. A general hypertrophy of the oral tissues may be noticed. Suppuration, perhaps preceding, perhaps following, a solution of the dental ligament, which permits the pocket to be found, and is the antecedent usually responsible for the loosening of the teeth. This loosening may, however, be present as a result of inflammation before suppuration has succeeded. The loosening may be attended with recession of the gum or not, and with or without pain. Locally, aside from the gingival congestions already

noticed, the teeth may be found elongated, the breath fetid, tartar freely present (although many cases progress to disaster with no appreciable deposit of tartar), pus sometimes oozing from the sockets, putrid taste in the mouth, tenderness of the teeth, already noted, and many times considerable irregularities, the natural result of the loosening of the teeth. Observation may disclose such systemic conditions as stomach dyspepsia, catarrh (as nasal catarrh or other mucous surface debility), constipation, phthisis, adenoid growths, general congestion due to intemperance, kidney disease, rheumatism, cold feet and other extremities, indicating poor circulation and mal-assimilation. Dr. Rhein has truly said that incurable systemic disorders make only palliation of pyorrhœa disorders.

Causes.—Dr. Rehwinkel, who first suggested the name "pyorrhœa alveolaris," ascribed this disease to constitutional and hereditary causes; Dr. G. C. Davis to low vitality and feeble vascularity; Drs. Witzel, Arkövey, and Black, that it is a specific infectious disease; Dr. L. C. Ingersol attributed it to sanguinary calculus; Dr. A. O. Rawls to mercurial taint, and the effects of chloride of sodium; Dr. Talbot to perverted conditions of secretions, low vitality and sanguinary calculus; Dr. J. D. Patterson to catarrh; Prof. C. N. Peirce to its being a manifestation of the gouty diathesis, having found uric acid and its salts at the apical ends of roots. Dr. W. X. Sudduth opposes the uric acid theory of Prof. Peirce, as also does Dr. Younger, who believes it to be of local origin, and due to diseased activity of the pericementum, caused by disturbed nutrition or local irritation: the late Dr. Bonwill agreed with Dr. Younger.

Treatment.—The first and one of the most important indications is to sterilize the mouth so that pathogenic organisms will not find access into the deep parts during the subsequent operations; then to remove all deposits from the roots of the teeth, and all necrosed bone from the margins of the alveolar processes. This can be accomplished with what are known as scaling instruments. An acquired and acute sense of touch is necessary to determine the thoroughness of the cleansing operation. The pockets formed in the gum may then be sterilized by syringing with a three per cent. solution of pyrozone, or with iodoform and eucalyptus, iodoform and oil of cinnamon, or with injections of chloride of

alumina, gr. iij to the ounce of water, also strong tincture of myrrh, aromatic sulphuric acid, nitrate of silver, 10 per cent. solution, 25 to 50 per cent. solutions of Argyrol: silver lactate is also useful and does not discolor. Peroxide of hydrogen, and also a solution of iodide of zinc, gr. xii–xiv to the ounce of water, are also recommended by Dr. Harlan, in the form of injections; and for chronic cases the latter is a solution composed of gr. xxiv to the ounce of water, after the parts are cleansed by injections of the peroxide of hydrogen. Another method: After thorough removal of deposits, syringe with aromatic sulphuric acid, diluted with one-half water, and apply night and morning a powder composed of creta preparatæ, ℥j; acidum boricum, ℥j. The use of "Robinson's Remedy" is also recommended, following the use of bichloride of mercury 1 to 500. An antiseptic and astringent mouth-wash should be employed frequently until the gums reattach themselves to the teeth.

Dr. Chas. B. Atkinson recommends first returning loose teeth to place laterally, and securing them with waxed sterilized ligatures. Then, beginning with the upper jaw, such scaling as may be indicated should be performed, after which the pockets should be carefully investigated with proper instruments, all foreign matter removed from them and from about the teeth, having recourse frequently to a 1/500 or 1/1000 solution of $HgCl_2$ in H_2O_2. This preparation of peroxide should be first allowed to remain in the pockets and about the teeth for perhaps even three minutes. It may be necessary to reduce the length of elongated teeth, but if direct pressure will answer, this should be resorted to and shortening of the bite avoided. See the patient daily for two weeks. Sometimes no application of medicaments will be indicated—perhaps a little scaling or scraping of overlooked deposit, from time to time. The appearances of the abnormal conditions seem to be best indicated by color, size and texture. A dark blue color of soft and spongy gum should be lanced to relieve the venous congestion, and then injected with aromatic sulphuric acid, full officinal strength. Should suppuration be imminent or present, the pus should be evacuated by incision, or by the injection of peroxide of hydrogen as a first step, followed by a delicate application of "caustic paste" (potassa fusa 2/3, carbolic acid, cryst. 1/3). A cherry-red color of slightly puffed

gum calls for salicylic acid solution saturated in 95 per cent. alcohol. The constant exhibition of antiseptic and stimulant mouth-washes is necessary, such as combinations of bichloride of mercury, tincture of calendula and distilled water, or hydronaphthol, tincture of calendula and distilled water; or peroxide of hydrogen and tincture of calendula. Systemic remedies are also indicated, such as tonics and cathartics, the latter in the beginning of the treatment; also digestive stimulation.

Dr. E. C. Kirk recommends a ten per cent. solution of aristol, rubbed up with oil of cinnamon, or oil of gaultheria and introduced into each suppurating pocket, and around the roots of the teeth at the base of each pocket, on wisps of absorbent cotton, saturated with the solution; also saturated solutions of sulphate of zinc and iodide of potassium, equal parts, in turn saturated with crystals of iodine; also, pyrozone five per cent. solution, or peroxide of sodium, or loretin, or trichloracetic acid alone or in combination with pyrozone, or glycozone, or bitartrate of lithia, internally. Dr. Bodecker recommends applying nitrate of silver by making a small platinum wire loop, warming it, and then dipping it into powdered nitrate of silver and carrying into the pockets; also solutions of 25 to 50 per cent. of argyrol. Rinsing the mouth before and after the application with salt water will prevent injury to surrounding tissues. Dr. Payne recommends warm distilled water followed by five per cent. solution of pyrozone, and then a concentrated solution of lactic acid. Dr. Gordon White recommends lactic acid, and where roots are very sensitive uses lactate of silver. Dr. Kirk recommends trichloracetic acid to facilitate removal of deposits: also Dr. Jarvie; and others sulphuric acid. Dr. B. F. Arrington medicates with sulphuric acid, campho-phenique, and carbolic acid. Dr. Essig recommends aqueous solutions of chloride of zinc, after all deposits are removed. Prof. Peirce recommends placing patient on an albuminous diet, and tablets of citrate of lithium. The cataphoric current with such medicines as are conductive, and also beneficial in the treatment of alveolar pyorrhœa, it is claimed, will increase their efficiency.

Irritation of the Dental Pulp—Hyperemia—is indicated by an uneasy sensation which develops into pain of a gnawing or burning character, the affected tooth being sensitive to changes of

temperature, painful in mastication, but exhibiting no symptoms of inflammation of the gum or peridental membrane.

Treatment.—The treatment must vary with the condition producing the affection. First remove all irritants. If the cause is systemic, constitutional treatment for the condition present is indicated. Saline cathartics, as the sulphate or carbonate of magnesia; diaphoretics, as spts. mindererus, or Dover's powder; diuretics, as preparations of nitre, often prove efficacious; also bromide of potassium. If the fluids of the mouth are irritative, they must be corrected. If a carious cavity exists, all foreign substances and the softer parts of carious dentine should be removed, and the cavity syringed with a tepid solution of bicarbonate of soda, potash or ammonia. Dilute carbolic acid, or wood creasote, may then be applied, and a non-conducting filling of a solution of gutta percha and chloroform be introduced. (See Dental Formulæ for Odontalgia and Pulpitis.)

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

Treatment.—The treatment of this condition of pulp is indicated in that of "irritation of the pulp." For soothing applications, solution of gutta percha and chloroform, tincture of hamamelis applied warm, oil of cloves, dilute creasote, equal parts of chloroform, aconite and tincture of opium, may be employed. (See Dental Formulæ for Odontalgia and Pulpitis.)

A useful anodyne and analgesic consists of

℞ Phenactin
Acetanilide . . . . . ā ā gr. xxx.
Quinia Sulph. . . . . gr. xv. M.
Divide into six capsules.
S. One morning and evening.

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

Fungous Growth of Pulp is indicated by the organ, as a result of continued irritation, assuming the form of a small vascular tumor or granular mass, attached by means of a pedicle, and which, in some cases, completely fills the cavity of decay in the crown of the tooth, and is often extremely sensitive and prone to hemorrhage.

Treatment.—When a tendency to fungous growth is discovered, the free application of carbolic acid or tincture of aconite followed by the use of chromic acid, will obtund the sensibility, when the entire tumor should be excised, and its reproduction prevented by application of nitric acid on a disc of cardboard.

Ulceration of Pulp—Putrescent Pulp.—Dr. Callahan's treatment with sulphuric acid, which agent destroys all animal tissues by dehydration on account of its strong affinity for water, has proven very effectual. The immediate application of bicarbonate of soda will neutralize its action on the tooth-structure. Peroxide of sodium, hydronaphthol, oil of gaultheria, Black's 1, 2, 3 mixture, iodoform, iodol, hydrochloric acid with pepsin, permanganate of potash, pyrozone, thymol, peroxide of hydrogen, peroxide of sodium, papaine, eugenol, eucalyptol, formalin, oil of cloves, bichloride of mercury, iodine and aconite, acetozone, the cataphoric current with a solution or agent which possesses conductivity, iodoform vapor or fumes, dehydration, etc., have all been employed with success. The treatment involves the opening of the orifice of exposure, sterilization, and removal of the pulp.

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

Treatment.—Apply anodynes, such as lead water, and those indicated in "acute inflammation of pulp" to relieve the pain. Open the pulp chamber, and completely extirpate the pulp.

Hypersensitiveness or Abnormal Sensibility of Dentine is indi-

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

Treatment.—Apply obtunding agents, as chloride of zinc, chloroform and aconite equal parts, carvacrol, oil of cloves, oil of cedar, oil of eucalyptus, tannin combined with glycerine or camphor, chloral, camphorized ether, oxide of calcium, carbonate of sodium, menthol, thymol, sesquichloride of chromium, sulphate of morphine and gum camphor equal parts, ethylate of sodium, carbonate of potash and glycerine, carbolized potash, campho-phenique; also chloride of ethyl, phenate of cocaine, tropacocaine, peroxide of sodium, vapocaine, eucaine, chloretone, etc. The cataphoric current with warm saline solutions of cocaine, or the solution of cocaine with electrozone, or cocaine dissolved in a ten per cent. solution of chloride of sodium. The application of chloretone in the form of a saturated ethereal solution has given very satisfactory results; also the ethereal solution of the salt of cocaine known as vapocaine. Ottolengui's method: Apply the rubberdam, dry cavity with bibulous paper, then insert a pledget of cotton saturated with absolute alcohol, then apply intermittingly a series of blasts of hot air to produce evaporation, until parts become whitened or thoroughly dry, then throw on a continuous spray of ether. A jet of nitrous oxide gas directed into the cavity of the tooth by a piece of tubing; also the vapor of alcohol, produced by heating the alcohol in a metal apparatus, and conducting the vapor into the cavity through a fine metal tube, have also been employed for the relief of the pain arising from hypersensitive dentine. The application of cocaine and alcohol by electrolysis has also given satisfactory results. (See Therapeutics of Electricity.)

Excavating Sensitive Cavities.—To a 1 per cent. solution of cocaine hydrochloride add an equal quantity of adrenalin chloride in normal salt solution which gives a solution containing 1/2 per cent. Hypodermically, inject slowly until the gum is blanched. A deep injection is not necessary and pressing the point of the needle on the periosteum should be avoided.

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

Treatment.—Gold caps or partial crowns, either in the form of ferrules or contour fillings, or fillings of other metals, will often arrest the process of abrasion, and render much worn teeth useful organs. Also the insertion of artificial posterior teeth will often prevent natural front teeth from being abraded by unnatural use.

Hypertrophy of the Alveolar Processes is indicated by an osseous deposit, either at the apex of the alveolar cavity, in which case the affected tooth is protruded from its cavity, or by a deposit of osseous matter on the wall of the alveolar cavity, in which case the tooth is forced to one side.

Treatment.—When the osseous deposit is in the bottom of the alveolar cavity, the length of the tooth may be reduced from time to time until a certain degree is reached, when the loss of the tooth is inevitable. When the deposit is upon the side of the cavity, the effect is irregularity or malposition, for which there is often no remedy but the removal of the deviating tooth.

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

Treatment.—During the early stages of this affection, the administration of large doses of iodide of potassium, and the application of counter-irritants, such as a saturated tincture of iodine or cantharidal collodion, have been suggested, to arrest the deposit and cause absorption. When the deposit is large and productive of pain and inconvenience, the removal of the affected tooth is inevitable.

Edentulous Neuralgia.—Caused by hypertrophy of the inferior dental nerve in aged persons in the absence of all the teeth, after the nerve makes its exit through the dental foramen. The remedy is a saddle-shaped plate for the artificial denture worn, so that the pressure is distributed to surrounding parts and not exerted upon the nerve as it passes out of the foramen.

Organic Defects of Structure, indicated by defects in the enamel, in the form of opaque spots, grooves or pits, congenital in origin, and due to altered functions from impaired nutrition.

Treatment.—Preventive by mitigating severity of diseases producing the condition, by the administration of proper remedies. For the pitting variety, properly inserted fillings.

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

Treatment.—Extraction, when they are a source of irritation, or an injury to the normal teeth, or are unsightly.

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

Treatment.—The most skilful treatment by properly introduced fillings and constant attention are necessary for their preservation.

Erosion of the Teeth is a progressive chemical solution of the enamel of the labial surfaces of the incisors, canines, and sometimes of the bicuspids, generally in the form of a continuous horizontal groove, smooth and regular, and not due to caries or mechanical abrasion; in some cases it may extend over nearly the whole of the labial surface, the color of the enamel being rarely changed. Erosion is the removal of the surface of the enamel, without apparent cause, although it has been ascribed to an altered secretion of the labial follicular glands, acid in reaction probably being the solvent. It is usually found in persons with a gouty diathesis. Its first appearance consists of a slight cup- or dish-shaped cavity in the enamel a short distance from the margin of the gum, usually on the anterior surfaces of the front teeth, although it is not confined to such teeth, the small excavations gradually broadening and deepening until the surface of the dentine becomes exposed, which remains hard and finely polished and a pit or groove is at length formed which gradually widens and deepens until a considerable portion of the crown of the tooth is destroyed. The affected area of tooth structure remains polished, and the invasion of the dentine is less rapid than the surface destruction of the enamel. True erosion differs from the destruction of the enamel in the form of pits and irregularities due to an acid condition of the fluids of the mouth, lactic acid being a prominent factor in promoting fermentative action.

Treatment.—The continued use of alkaline applications and alkaline mouth-washes. Phillips' milk of magnesia is an excellent application. A saturated solution of the nitrate of silver acting on the mucous secretion, by painting over the mucous surface in contact with the eroded portion of the tooth, has been recommended as stopping the erosion. In advanced stages, its progress may be arrested by fillings of durable material.

Absorption of Process and Recession of Gum is indicated by a slight increase of redness, some congestion and a shrinkage of the margins of the gums, and may be accompanied with a slight purulent discharge about the neck of the affected tooth. The symptoms resemble those of chronic inflammation of the gums. The progress of the affection is generally slow, and it is often first observed about the necks of the canine teeth. Teeth so affected become more susceptible to impressions of heat, colds, acids, etc., and eventually loose.

Treatment.—To arrest the progress of this affection, first remove all irritants, and cleanse thoroughly, polishing the exposed surfaces. Correct the nature of the fluids of the mouth, if at fault, by constitutional treatment, the use of alkaline lotions, such as lime water, and detergent dentifrices. Such agents as a weak solution of chloride of zinc, to produce healthy granulation, carbolic acid, nitrate of silver, and judicious pressure, may be employed with advantage. A moderately stiff brush and floss silk are useful adjuncts to the treatment.

Necrosed Teeth.—The term "necrosed" is applied to a tooth when the vitality of its pulp and lining membrane is destroyed, the peridental membrane, however, maintaining a degree of vitality which prevents the tooth from becoming an irritant, so as to insure its loss as an effete organ.

Treatment.—When a necrosed tooth is not productive of injury to the adjacent structures, and there is a probality of rendering it a useful organ, the pulp canal should be thoroughly exposed, cleansed, and irrigated with disinfectants, antiseptics, etc., and then filled, together with the crown cavity, with a suitable material. As necrosed teeth are frequently considerably discolored, on account of the tubuli of the dentine absorbing coloring matter from the dead pulp, such bleaching agents as chloride of lime, chloride of alumina, oxalic acid, chloride of soda,

sulphite of soda, combined with boracic acid, cyanide of potassium, tartaric acid in combination with chloride of lime, chloride of zinc, also alum in combination with liq. sodæ chlorinatæ, may be employed to improve their appearance, also use of nitrous oxide in combination with chloride of sodium, also peroxide of hydrogen, or pyrozone.

Infantile Paralysis during the Period of Teething.—Infantile paralysis, or poliomyelitis, is an obscure affection peculiar to a certain season, which has given to it at the hands of some the name of "warm weather spinal disease." It comes on suddenly, but seldom after the age of four years. According to Gowers, of all cases under ten years, three-fifths occur in the first two years of life; and he claims that a considerable number of cases are congenital. There is usually a febrile initial stage followed by the sudden onset of paralysis in one leg or arm. In more than half the cases the lower limbs are affected; of the remainder, the majority represent implications of the arms, notably the deltoid muscles, and legs, or, perhaps, arm and leg, and very seldom the upper extremity alone. The cause of infantile paralysis is generally assigned to teething, cold or damp, injuries to the spine, measles, scarlatina, malarial or other fevers, convulsions or concussion. Dr. Rot, at the Fourth Prussian Congress, declared that heredity is the only etiological factor that has been proven. "The primary cause of the affection must be sought for in the modifications of that part of the fecundated ovum which enters into the formation of the nervous system." During the period of dentition, children are liable to disorders of the cerebro-spinal system, and as from such causes we find convulsions the cause of the death of numberless infants seemingly robust, so we see the same cause producing paralysis. There is loss of heat and atrophy in the affected limbs, and the latter may be a feature of the disease dependent upon the morbid changes in the nerve-centres. The atrophy extends to the bony system, the nutrition of which is involved; and it is evident that the atrophic degeneration, if not inherent, is a real sequence of inflammatory process in the spinal cord.

Treatment.—The treatment of infantile paralysis consists in the application of mild galvanic stimulation by the uninterrupted current conveyed through the affected cord out through the

nerves of the flabby muscles; the skin may also be stimulated with salt and sulphur baths. In the early stage Dr. Althaus advises the injection of ergotine 1/4 gr., for a child a year old, in order to contract the arterioles of the part to deplete the blood supply. He stimulates the muscles as they become affected with injections of strychnine. Conium and chloral may be used to calm nervous excitement. Dr. Sequin recommends counter-irritation over the spine, bromides and arsenic, while others use cupping, leeches, and iodide of potassium. Brown-Séquard recommended belladonna to control the inflammatory process of the spinal cord. If pain or fever are present, ether spray to the spine, ice, gelsemium, aconite, antipyrine internally. Rubbing, muscle-beating and massage have also been employed as adjuncts.

Chemical Bleaching of Teeth.—Prof. Truman's method consists in liberating chlorine from calcium, hydrochlorite, or chloride of lime, in the cavity of decay and pulp canal by a dilute acid. He recommends a fifty per cent. solution of acetic acid, although oxalic, citric or tartaric acid may be used, or indeed any dilute acid to liberate the chlorine. The upper third of the pulp canal should be filled with gutta percha, and the cavity in all cases should be washed out with ammonia or borax, to remove the fatty matter previous to the introduction of the bleaching agent. Labarraque's solution of soda has also been used as a medium from which to liberate the chlorine. Dr. A. W. Harlan uses aluminum chloride in the cavity, from which he liberates the chlorine by means of peroxide of hydrogen. Dr. Edw. C. Kirk's method consists of liberating sulphurous acid, So_2, from sodium sulhpite, Na_2SO_3, by means of boracic acid. The two substances, in the proportion of 100 grains of sodium sulphite and 70 grains of boracic acid, are desiccated separately, and then intimately ground together in a warm dry mortar. In using this powder, the tooth is carefully dried under the dam, and the powder is packed into the pulp-cavity and cavity until both are full; the reaction which liberates the sulphurous acid is then brought about by moistening the powder in the tooth with a drop of water, and the orifice of the cavity is immediately closed with warm gutta percha; also peroxide of sodium 50 per cent. solution followed by application of a dilute acid, such as sulphuric hydrochlorine, or trichloracetic, all applied on asbestos fibre; also

pyrozone, 5 per cent. and 25 per cent. solutions; also decomposing chloride of magnesia or chloride of tin with peroxide of hydrogen within the tooth. (See Cataphoresis). Acetozone is highly recommended as a bleaching agent, especially for discoloration from organic stains.

Herpes Zoster of Mouth and Gums.—An acute circumscribed inflammatory affection, characterized by an eruption of vesicles of herpes on a red, inflamed basis, the vesicles being disposed in groups and follow the group of the adjacent nerve. The eruption is preceded and accompanied by a very severe neuralgia of the fifth nerve. The period of invasion (three days) is accompanied by a well-defined fever and other general symptoms. The period of eruption begins on the third day, and lasts about three weeks to one month, the pain being persistent. It is probably of an infectious origin, and is due to a neuritis of the affected region which leads to trophic changes.

Treatment.—Dr. Harlan recommends a palliative treatment, which consists in placing cotton-wool between the cheek and teeth to prevent friction, and on it an ointment consisting of cocaine and morphine.

Merck's Bulletin gives the following treatment for herpes zoster:

MIXTURE.

℞ Extract gelsemium
Sodium sulpho-carbolate } of each 4 grammes.
Distilled water ..... 90 grammes. M.
Sig. One teaspoonful every two hours.

At the same time five drops of the tincture of belladonna are administered every two hours until a slight dryness of the pharynx is experienced.

LOTION.

℞ Lead acetate
Powdered alum } of each 4 grammes.
Distilled water ..... 120 grammes. M.
Sig. Externally.

Compresses moistened with this solution are applied to the affected parts, and renewed every two hours. It is claimed that the pain disappears within a few hours, and that the disease is considerably shortened by this treatment.

Dental Caries is indicated by a process of gradual softening and chemical disintegration of the tooth substance, molecule by molecule, caused directly by micro-organisms which attach themselves and grow in contact with the surface of the tooth, being protected by a gelatinous film, and forming an acid which acts upon the tooth tissue, and thus affords access to the micro-organisms. Artificial coverings for the retention and protection of the micro-organisms in contact with the tooth substance may also result from badly performed technical procedures, such as imperfect fillings, irregularity appliances, gold bands, caps, etc. The micro-organisms have no power of penetrating the enamel until its substance is dissolved by their acid excretions making room for them, the lime salts of the tooth substance being first dissolved away by deleterious agents, the progress being hastened by certain structural defects in the enamel and dentine. Incipient dental caries is indicated by an opaque, whitish or gray appearance of the enamel. A pale brown varying to a nearly black color indicates the existence and progress of dental caries in the tooth tissues; the deeper the color the slower the progress of the caries, and the paler the color the more rapid the progress.

Treatment.—Incipient caries should be removed with great care, and the exposed surface of tooth structure prepared to resist further attacks by giving to it as high a polish as is possible, and the patient warned in regard to its future cleanliness. Deep-seated caries should be removed, and its further progress arrested by thoroughly sterilizing or disinfecting the cavity by antiseptics and disinfectants, and the careful insertion of fillings of a durable material. During pregnancy all operations on the teeth should be painless, and long, wearying sittings be avoided. Caries of the teeth of pregnant women can be arrested by plastic fillings until such time as the patient can the better endure more permanent operations. The preventive measures consist in the thorough and frequent use of the tooth-brush and its adjunct, floss silk, at least three times a day, assisted by a proper dentifrice and antacid antiseptic mouth wash. For incipient dental caries: After removing all softened matter and polishing the affected area a ten per cent. solution of nitrate of silver may be applied to arrest the further progress, as it will not discolor the tooth structure in this strength.

Calcic Inflammation of the gums or peridental membrane, or of both, is caused by deposits of either salivary or serumal calculi. The tissue in contact with the calculus becomes hyperemic, then œdematous, and is kept in a constant state of irritation; and then inflammation follows with absorption of the pericementum and alveolar process, and looseness and loss of the tooth follows.

Treatment.—The calculus should be removed by scalers, and the surfaces which it covers should be smoothed and polished; astringent and antiseptic mouth-washes will complete the cure.

Opening Abscesses.—Abscesses moderate in size, will not require but one incision. In deep-seated abscess, the method is to first incise skin and fascia, and then with hemostatic forceps enter the tissue until the abscess is reached, when the handles are unlocked, and the blades separated, so that on withdrawing the forceps an opening will be made large enough to admit a drainage-tube of the proper diameter. By such a method danger of injuring important vessels and nerves is avoided. Alveolar abscesses may be opened by trephining the outer wall of the alveolar cavity at the point of suppuration, and the pulp-canals rendered aseptic to prevent a recurrence of the abscess, the proper filling of the canals completing the treatment. The spray of liquid air is very beneficial before and after incision. (See Liquid Air.)

Septicemia is a form of blood-poisoning resulting from the absorption of poisonous (septic) products. According to Billroth, septicemia bears the same relationship to surgical or traumatic fever that pyemia does to suppurative fever, each being a malignant type of the corresponding milder affection—in other words, a malignant form of putrid infection. It frequently occurs as a complication of wounds, compound fractures, gangrenous conditions, and especially in wounds with abundant discharges, where micro-organisms have had free access and a process of putrefaction established.

It is characterized by such constitutional symptoms as high temperature, excessive prostration, disorders of the nervous system, inflammation of internal organs, with typhoid symptoms, and more or less heart failure. The septic poisoning is due to

the entrance into the blood of ptomaines, certain forms of micro-organisms, or some ferment-like substance possessing the power of reproduction, and acting like the virus of diphtheria or tetanus. Septicemia is classified as septic intoxication, and septic infection; in the first class there is early absorption of the products of putrefaction; but in the second class the symptoms develop more slowly, and progressive changes occur which continue to a fatal termination notwithstanding all the efforts at antiseptic treatment, and is due to the invasions of micro-organisms into the blood. The prominent symptoms of septicemia are a chill, followed by a rise of temperature 101° to 105°, nausea, vomiting, and at times diarrhœa, followed by delirium and coma. The symptoms depend upon the character of the infecting organisms.

Treatment.—Both local and constitutional. The prophylactic treatment consists in inducing an aseptic condition of the wound and surrounding parts and the employment of antiseptics. Irrigation with bichloride of mercury solution, 1 to 1000, or peroxide of hydrogen in moderate quantity, or carbolic acid solution, 1 to 20, is necessary, and in some cases curetting the surface of the wound to permit the remedy to reach deeper parts is also required. The wound is then packed with antiseptic gauze, or warm antiseptic fomentations may be applied to bring about free drainage.

Saline purgatives are employed to eliminate the organisms, and the strength of the patient maintained by quinine and stimulants until the secretory organs shall have eliminated the poison from the blood. Tincture of digitalis in from 5 to 10 drop doses is employed for the heart failure, or strychnia in doses of 1/40 to 1/30 of grain every two or six hours. The diarrhœa is to be controlled by opium, or bismuth and tannin.

Pyemia or Septic Fever is a disease developed during the process of suppuration in wounds or the formation of abscesses, and is induced by the presence of pyogenic micro-organisms (bacteria) in the blood. It is accompanied with the formation of secondary abscesses in various parts of the body, which results from the invasion of micro-organisms and their growth into colonies and in such a manner establishing independent centres of suppuration. It never occurs before suppuration has been established. It is caused by suppurating wounds, and usually when the formation

of pus is most active, although it may commence during any stage of the suppurating process. Pus microbes are the active cause of the disease, and it is more common to men of middle age than to women or children or even the aged. The pus microbes cause the adhesion of the blood-corpuscles and the formation of thrombi (or clots of blood formed within the heart or in blood vessels). The symptoms of pyemia are chills, increase of temperature 104° to 106° F., ending in a profuse perspiration, a decrease of temperature to normal or lower. The fever is of an irregular, intermittent type, and the development of secondary abscesses is indicated by febrile exacerbations, and local inflam matory symptoms. Swelling of the parotid gland with the formation of metastatic abscesses is sometimes a symptom of this affection. The breath has a sweetish, purulent odor, the pulse becomes weak and rapid, and the strength rapidly fails. The tongue becomes dry and brown coated, and the teeth and gums are coated with sordes. Erythematous patches appear, which have a tendency to form pustules. The prognosis is very unfavorable in acute cases of pyemia.

Treatment.—The treatment is in a great degree prophylactic to prevent suppuration, and antiseptic treatment is indicated, and the wound rendered aseptic. Metastatic abscesses must be at once opened and disinfected. The constitutional treatment consists of nutritious and easily digested food, and alcoholic stimulants. Quinine in large doses is often employed, and carbonate of ammonium and digitalis during the stage of prostration. Pyemia resulting from aveolar abscesses demands the extraction of the affected tooth and curetting the abscess cavity, and after irrigating with antiseptic solutions, the cavity should be packed with antiseptic gauze, or iodoform gauze, and this continued until a healthy granulating surface is formed.

Shock and Collapse.—Shock is the depression of the vital powers by severe injuries, surgical operations, or profound mental impressions.

Collapse is a state of nervous prostration, and both it and shock have been classed together. Collapse arises from various causes of which shock may be one, but shock may occur instantaneously in a healthy person, whereas collapse is generally manifested in persons who have been subjected to a prolonged

nervous strain which has greatly exhausted them. Prolonged dental operations depress the vital powers of those already exhausted from disease, overwork of mind or body, and sometimes in chlorotic girls, pregnant women, and delicate children; hence, such conditions should be recognized by the dentist, and properly appreciated, and all operations of a painful or prolonged character should be avoided, if possible, until such times as the improved condition of the patient will justify; or, if imperative, treatment which will allay nervous irritability and prevent shock should be instituted.

Treatment.—The patient should be laid as flat on his back as possible, or even with the head lower than the rest of the body —the feet and extremities raised. Some authorities recommend as a good plan occasionally to bandage the extremities from their tip towards the body, in order that the blood they contain naturally may be pressed to the vital organs. Should cyanosis occur it indicates that the head is being too much depressed.

Warm stimulating drinks, such as of whiskey, brandy, etc., diluted, are serviceable if they can be swallowed. When the patient cannot swallow, almost as much benefit can be gained by resorting to enemata of hot coffee with brandy, with ammonium carbonate, etc. Nitrite of amyl will assist in equalizing the circulation. The hypodermic use of strychnia, and tincture of digitalis, will stimulate the activity of the heart. Failing respiration may be stimulated and sustained by atropia hypodermically injected also. Care should be exercised in giving strong liquors, for if the patient cannot swallow, some of the irritating fluid may escape into the larynx, and the coughing may be so violent as to prove fatal; the same is true of inhalations of strong volatile stimulants. Reaction must not be established too quickly. External heat is often beneficial, such as the warm bath, hot water bottles or bags. Artificial respiration may also be resorted to in extreme cases, or galvanism—the Faradic current to stimulate the diaphragm, applied with one pole over the phrenic nerve, the other over diaphragm. Small chips of ice, made by standing the piece with the grain upright, and splitting off a thin edge with the point of a pin, if the patient can swallow them whole, will allay nausea and vomiting: also, if the patient

can swallow, twenty drops of aromatic spirits of ammonia in a little water may be given every two or three minutes, until four or five doses have been taken. Smelling salts (ammonia), or cologne on a handkerchief may be of service in mild cases.

Fainting-Syncope.—Persons may often faint without any perceptible cause, but debility of the nervous system favors it; or it may occur from the sight of blood. In nervous patients fainting may occur after severe hemorrhage, etc. The symptoms are expressionless face, pallor of skin, lips, and oral mucous membrane, coldness of surface of body, irregular respiration, breathing being irregular in rate and depth, dilated pupils, mental apathy, loss of voluntary muscle-movement, and occasionally nausea and vomiting.

Treatment.—The patient should be placed in such a position that the head will be lower than the body: if sitting in a chair the patient should not be removed, but the chair lowered backwards, the head being supported, until the floor is reached. This backward and downward movement is readily made in a dental chair by lowering the movable back. Usually the consciousness returns as soon as the head of the patient is lowered. The dress should be loosened about the neck and chest. For an adult, a teaspoonful of brandy in a little water, or twenty drops of aromatic spirits of ammonia in water, may be given at short intervals, until consciousness and restored action of the heart occurs.

Pressure Anæsthesia for Obtunding and Removing Dental Pulps.—Pressure anæsthesia implies a method of painlessly removing dental pulps by forcing solutions of local anæsthetics into the tissue by means of pressure. The usual agent employed is cocaine hydrochlorate, a crystal of which is dissolved and the solution applied to a pledget of cotton which is pressed into the cavity on the surface of the pulp by a piece of unvulcanized rubber. The pressure made is gentle but firm, with a suitable blunt instrument. Some prefer cocaine crystals dissolved with adrenalin chloride, others a solution composed of

℞ Cocaine hydrochloridi . . . . . gr.vj
Phenolis . . . . . ♏ ij
Aquæ menthæ piperitæ . . . . . f. ℥j. M.

ANÆSTHESIA.

Anæsthesia is defined as a loss of feeling or sensation produced by drugs which have the power of causing insensibility to pain, and which, according to their peculiar effects and mode of administration, consist of two classes—general and local anæsthetics.

Complete or full anæsthesia implies not only the abolition of pain, but the temporary cessation of muscular activity.

Partial anæsthesia implies the temporary abolition of conscious sensation, when the cerebrum is paralyzed, but the reflex centres of the spinal cord are still sensitive and muscular activity is not suspended. Infiltration anæsthesia is local anæsthesia confined to a limited area, and produced by injecting obtunding solutions beneath the skin.

General anæsthetic agents produce their effects by direct action upon the nerve-centres and in some cases cyanosis and asphyxia attend the anæsthesia; in other cases a depressant action upon vital structures is produced, which is a greater danger than is a moderate degree of asphyxia; the action of chloroform is an example.

Ether, and also chloroform to a certain degree, may, at the beginning of an inhalation, cause a sense of suffocation which is not produced by nitrous oxide gas.

The effect upon the cerebrum causes a disturbance of nerve function which is manifested by laughing, crying, muscular movements, etc.; light affects the pupils and coughing is sometimes present; all of these effects constituting a stimulating stage.

Before the control of the lower part of the cerebro-spinal system by the cerebrum is removed or consciousness completely abolished, violent muscular action may be induced, attended with a flow of tears, secretion of mucus, and vomiting if the stomach contains any food, which effects constitute a stage of excitement. The succeeding stage is generally characterized by snoring or stertorous breathing, caused by the vibration of the soft palate, indicating complete or full anæsthesia with relaxation of the whole muscular system, and absence of reflex activity; a condition resembling one of profound sleep. Such symptoms as these show a temporary paralysis of the nervous and muscular systems, with the exception of those of respiration and circulation,

attended with contraction of the pupils, the eyes being insensible to light, and the cornea to touch.

Ether causes more flushing of the face than chloroform. The most important organs to closely watch are the pupils of the eyes and the conditions of the reflexes. Reflex irritability may be diagnosed by touching, with a clean finger, the cornea, or conjunctiva of the eye, and if no response is shown by the patient closing the eyelids, the anæsthesia is complete. Relaxation of the muscles is shown by the falling of the arms to the sides, when, previous to beginning the inhalation, the fingers of both hands have been interlocked over the chest; also by inability to raise the hands when requested to do so, although muscular rigidity may continue sometimes even after reflex response is impossible, as is shown by the jaws remaining tightly closed; in such a case the effort to induce complete anæsthesia must be somewhat prolonged, or the jaws forcibly opened, as in the extraction of teeth, where it is not necessary to carry the anæsthetic effect to the profound stage. Any irregularity or interruption of respiration is a sign of danger, and requires the suspension of the inhalation and the admission into the room of free air, the employment of respiratory stimulants and, if necessary, artificial respiration.

The condition of the heart in regard to its action and rhythm, is noted by the pulse felt at the wrist or temple, and any irregularity and weakness should be carefully noted; the recumbent posture with the head lower than the body is very necessary in case of a weak pulse, together with the administration of stimulants.

When a sudden failure of the heart occurs, as in the administration of chloroform, it is caused by cardiac disease, or the too rapid administration of the anæsthetic, and also the exclusion of air.

Chloroform should always be administered freely mixed with air. Besides watching the pulse, the pupils of the eyes should be closely watched, as dilatation indicates a condition of profound anæsthesia; in which the respiration is slow, the symptoms resembling those of a normal sleep; it is during the continuance of this stage that any dangerous symptoms which may arise are to be recognized and treated, as the reflexes do not occur in this stage. When such symptoms occur, the inhalation must be sus-

pended and restorative measures be resorted to, such as lowering the head, the inhalation of nitrite of amyl, electrical stimulation, or artificial respiration.

Syncope resulting from chloroform administration should also be treated by lowering the head, the use of diffusible stimulants such as the aromatic spirit of ammonia by the mouth, if swallowing is possible, or ammonia by inhalation. The cardiac and respiratory stimulants hypodermically administered when respiration is greatly lessened consist of strychnine, atropine, caffeine and digitalis, with artificial respiration, the danger being from paralysis of respiration; a paralyzed condition of the heart by chloroform, however, is fatal. (*See Modes of Artificial Respiration.*)

Ether is regarded as the safest anæsthetic agent for the production of prolonged anæsthesia. Its action is directed largely to the nervous system, which becomes profoundly affected; it frequently causes spasmodic action and suspension of respiratory action, and when death is caused by ether, it is from paralysis of respiration. When ether is administered in combination with nitrous oxide gas, the patient becomes more rapidly narcotized. The greatest objections to the use of ether are the excitement it causes, the prolonged recovery from its effects and the large quantity of the drug necessary.

Autointoxication—poisoning by some uneliminated matter (toxins) formed within the body—is another danger which attends the administration of some anæsthetic agents, as asphyxia is thought to be an important factor in causing such a condition

Nitrous oxide gas is perhaps more extensively employed for the extraction of teeth than for any other operation. The symptoms resemble those of asphyxia, and for this reason it is more important to pay attention to the respiration than to the pulse when administering this agent; the few after-effects may consist only of headache and malaise. The same contraindications, however, exist in regard to the employment of all general anæsthetics —ether, nitrous oxide gas and somnoform, as well as chloroform— and prohibit their use. Nitrous oxide, being non-irritating, may be considered the safest of the general anæsthetics on account of its slight effects upon vital structures and the short duration of the anæsthesia it produces; but few cases of death from nitrous

oxide have been reported, and it is doubtful if they can be attributed wholly to it.

The asphyxia attending the inhalation of nitrous oxide gas is principally due to the closed inhaler shutting off the oxygen, and is of such short duration that it may not be considered as an important factor in causing deleterious effects; combination, however, of nitrous oxide and oxygen admits of the proper oxygenation of the system, and prevents cyanosis and asphyxia.

In regard to somnoform, perhaps the greatest danger from the inhalation of this combination of drugs, is the cerebral stimulation it causes, as apoplexy from arterial rupture within the brain would prove fatal. There are certain conditions which forbid the administration of general anæsthetics, such as serious affections of the heart, lungs, brain and kidneys, which may obstruct respiration and circulation; such diseases of the heart as inflammation of the heart muscle or substance of the heart (myocarditis) and fatty degeneration of the heart (myocardial degeneration). The different effects caused by general anæsthetic must also be considered.

Before and during the administration of general anæsthetics, certain preparations should be made and precautions observed. When chloroform or ether is to be administered the operator should first ascertain the condition of the heart, lungs, brain, and kidneys, and be governed accordingly.

The patient should be directed to taken no food for at least five or six hours before the inhalation, to avoid vomiting; an active cathartic should also be taken some twenty-four hours before the administration; any artificial denture worn in the mouth must be removed; the clothing about the neck of the patient should be so loosened as to allow free respirations, and directions given to take deep inspirations when inhaling the vapor. A third party should always be present, so that the operator may not be made the victim of any imaginations of an anæsthetized female patient. It should also be remembered that the vapor of some anæsthetic agents, especially that of ether, is explosive and heavier than air, diffusing itself in the lower part of the office room, and hence it should not be exposed to a gas flame or open fire; the only safe light to use is the incandescent electric light. Nitrous oxide gas is not combustible, but is a

supporter of combustion. (*See Administration of Anæsthetics and Local Anæsthetics.*

CHARACTERISTIC INDICATIONS OF THE TONGUE.

The tongue, when in a normal condition, should be freely movable, of a pink color, and the dorsum marked in the centre by a slight longitudinal depression: a velvety appearance, soft, moist and warm to the finger; the fungiform papillæ circular in outline, and deeper pink than the surrounding surface; the circumvallate papillæ, arranged in a V-shaped row, having the form of an inverted cone, surrounded by an annular elevation. Fever causes the tongue to be frosted or coated; gastro-intestinal affections are attended by coating of the tongue, and the various appearances of this coating are of important diagnostic and therapeutic significance. Inflammation reddens the mucous membrane and makes it hot and tender, increases its moisture, changes the surface of the tongue, and causes the formation of aphthæ, ulceration, and even gangrene. In aphthous stomatitis the edges of the tongue are clean and red, while its dorsum is covered with a thick white coating. In ulcerative stomatitis the tongue, besides presenting the marginal ulcers, is swollen and heavily coated with a dirty, yellowish white fur. In thrush the mucous membrane is covered with white, curd-like flakes, due to the development of the parasite *oidium albicans*. Prior to the appearance of the flakes the mucous membrane is purplish-red and sticky, and its secretion acid in reaction. In severe neuralgia on one side of the face, the tongue presents an unilateral furring, thickening of the mucous membrane, or enlargement of the papillæ. Acute or chronic alcoholism causes a tremulous and foul tongue. Migraine causes a much furred surface of the tongue. When paralyzed, the tongue presents the appearance of a sodden mass lying in the mouth; in chorea its movements are jerking and irregular; in cerebral disease, the tongue shows a tendency to become thickly furred, and very foul, especially in apoplexy due to hemorrhage. Allowance, however, must always be made for individual peculiarities, in shape and size of the tongue, as also appearance, for effects of certain habits, such as excessive smoking or chewing tobacco, etc., taking iron, or other

medicines, or for any local irritation. In some individuals the surface of the tongue presents constantly a thick fur without disturbance of the organs or appetite, while on the other hand, a perfectly clean and healthy-looking tongue may be associated with severe dyspeptic symptoms or serious alimentary trouble. The common appearances of the tongue are supposed to indicate the following conditions:

A White Coated Tongue indicates febrile disturbance.

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

A Brown Dry Tongue indicates depressed vital power.

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

A Red Dry Tongue indicates inflammatory fever or pyrexia.

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

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

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

DENTAL MATERIA MEDICA
AND
THERAPEUTICS.

ACACIA—GUM ARABIC.

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

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

It is soluble in two parts of water, and forms a viscid solution known as mucilage.

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

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

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

Dose.—Of the gum, ℥j *ad libitum.* Of the mucilage (℥iv, water ℥vj) ℥ij to ℥vj daily, or *ad libitum.*

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

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

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

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

Prof. Bonafoux, of the Academy of Medicine, Paris, recommends a powder composed of equal parts of gum arabic, colophony and carbon, as possessing great hemostatic powers, and capable of arresting the bleeding of large arteries.

DENTAL FORMULA.

For Inflamed Mucous Surfaces.

℞ Pulveris acacia. . . . . ʒ ij
Sodii boratis. . . . . ʒ ij
Fiat pulvis.
Sig.—Apply to inflamed part.

ACETANILIDE—ANTIFEBRIN, PHENYLACETAMIDE.

Formula.—C_8H_9NO or $C_6H_5N\ (C_2H_3O)H$.

Derivation.—Acetanilide is a derivative of aniline, made by adding an excess of glacial acetic acid to pure colorless analine. It is in the form of a white crystalline powder of neutral reaction, without odor or disagreeable taste, slightly pungent, producing a burning sensation when applied to the tongue. It resembles "mother of pearl" when evaporated by heat, in the form of large scales. It is soluble in 200 parts of cold water, in 5 parts of alcohol, and freely soluble in ether and chloroform. It is not altered by acids or alkalies. The pure drug should be white or of a faint rose-tint, and should form a colorless liquid and completely volatilize when heated upon a platinum surface. Water of a temperature of 105° F. will dissolve one part of it to fifty of the water; alcohol, from 3 to 5 parts, and ether and chloroform in larger proportions.

Medical Properties and Physiological Action.—Acetanilide is antipyretic, analgesic and anodyne, and in ordinary doses its action is less marked on healthy persons than when fever is present, as its most apparent action is to reduce temperature by converting oxyhemoglobin into methemoglobin in the red blood-corpuscles interfering with oxidation. When an excessive quantity is absorbed, the alkalinity of the blood is reduced, the red corpuscles destroyed,

the hemoglobin liberated and appearing in the urine, which is changed to a dark-brown color. It increases the quantity of uric acid and urea present in the urine. Large doses may cause diastolic arrest of he heart, preceded by motor and sensory paralysis. Small doses increase the action of the skin and kidneys. The blood-pressure at first increases, but soon falls, and the heart's action becomes slower. It is contraindicated in large doses in the low fevers, owing to its action on the blood cells. It is eliminated by the kidneys. Belonging to the aromatic series of antipyretics, derived from coal tar, it possesses advantages over all the others from the same source. In some cases toxic effects, ascribed to impurity, or peculiar susceptibility to its action, have resulted from its administration; cyanosis and collapse also have occurred, as well as vomiting and profuse perspiration. Such ill effects from acetanilide must be counteracted by the application of external heat, vigorous alcoholic stimulation, with hypodermic use of ether, atropine, and strychnine, in order to support the respiration and circulation. Acetanilide is much used for headache, neuralgia, rheumatism, facial neuralgia, locomotor ataxia, sciatica; in acute inflammatory rheumatism it reduces the temperature, relieves the pain and swelling. It is also used in croupous pneumonia, scarlatina and other febrile affections of children.

It relieves any tendency to nausea and vomiting, and is usually tolerated by a weak stomach. On account of its diuretic action acetanilide is especially harmless in kidney affections. Acetanilide is the most powerful of the antipyretics of the coal tar derivatives, and must be used cautiously. Locally it is used as an antiseptic powder. Antidotes—emetics and stimulants.

Dose.—The dose varies from grs. ij, repeated every hour, to grs. vj every three or four hours; it may be given in the form of pill, powder or tablet triturate. Its prolonged use causes it to lose its effect; but its action is renewed if the drug is withheld for 24 or 48 hours.

Dental Uses.—Acetanilide is employed in dental practice for facial neuralgia, pulpitis, and irritation caused by pulp nodules and hypercementosis; internally administered in connection with the application of the devitalizing mixture to relieve the pain of the latter, in doses of two and one-half grains, repeated every

hour until ten grains have been taken; also for the relief of the pain of periodontitis, and alveolar abscess, etc., etc. For periodontitis, first paint the gum near affected root with tincture of aconite and tincture of iodine, tincture of canabis indica, and comp. tincture of benzoin, equal parts, then apply a capsicum plaster to gum, and administer two and one-half grains of acetanilide; repeat the acetanilide, if necessary, every two hours until ten grains are taken. In facial neuralgia, periodontitis, etc., it has proved effectual in cases where quinine has failed, or has been contraindicated. The powder is used as an antiseptic for dusting upon wounds after surgical operations and acts a substitute for iodoform.

Formalide.—Antiseptic and Germicide. It is composed of acetanilide 1/2 per cent., formaldehyde 1/4 per cent., boroglyceride 1 per cent., sodium benzo-borate 2 per cent., with eucalyptol, thymol, menthol, oil gaultheria, alcohol and witch-hazel

DENTAL FORMULÆ.

For Facial Neuralgia, Neuralgic Headache, Acute Periodontitis, etc.

℞ Acetanilide . . . . . gr.iij
Ammonium chloride . gr.j
Citrated Caffeine . . gr.ss
Sodium bicarbonate . gr.ss M.
Into compressed tablet form.

For Pain of Pericementitis.

Dr. A. W. Harlan.

℞ Acetanilidi . . . . . gr.viij
Syr. simple . . . . . ℥ij
Spir. Frumenti . . . ℥ij M.
Signa.—One-half of the above at one time, followed in 5 hours by the other half.

For the Pain of Pericementitis and Alveolar Abscess.

U. S. Pharmacopœia.

℞ Pulvis acetanilidi comp. . gr.xij
Ft.—Chartulæ No. 2 . . . .
Sig.—Take one powder at once and the other in two hours if not relieved.

For the Pain of Abscess and Putrescent Pulp.

U. S. Pharmacopœia.

℞ Pulvis acetanilidi comp. . . . . gr.xij
Ft.—Chartulæ No. 2 .
Sig.—Take one powder at once and the other in two hours if not relieved.

For Simple Fevers of Children.

Dr. Hollopeter.

℞ Acetanilidi . . . . . gr.xviij
Hydrarg. chlor. mitis gr.j
Sodii bicarb. . . . . gr.xij
Sacch. lact. . . . . gr.xv
M. Ft.—Chart No. xij.
Signa.—One every 2 hours until 3 are taken.

A Convenient Prescription for Acetanilide (Antefebrine).

Dr. E. L. Clifford.

℞ Acetanilidi . . . . ℥j
Sp. vini gallici . . . ℥iv.ss
Syr. simple . . . . .
Aquæ . . . . . āā ℥vj M.
Signa.—A tablespoonful contains 5 grains, an adult dose.

ACETOZONE—BENZOYL-ACETYL-PEROXIDE.

Acetozone belongs to the great class of compounds of which hydrogen peroxide is a well-known representative. It differs materially, however, from the hydrogen peroxide in its mode of action and in being possessed of much greater germicidal power. Although crystalline in form, it is obtained in form of powder, one-half of which by weight is pure acetozone and the other half an inert substance. Acetozone melts at 98° F. and should not be exposed to heat or permitted to come in contact with a heated body; and it should, also, be kept in a dry place owing to its full germicidal activity being developed by a process of hydrolysis. Acetozone is placed by Dr. Hoff next to the hydrogen and sodium dioxides.

Medical Properties and Physiological Action.—Acetozone is an antiseptic, germicide, and bleaching agent. It is thought to be superior to the ordinary antiseptics and very destructive of all kinds of germs, as well as effective in any condition due to the bacterial or fermentative organisms attended with suppuration. The form employed is the aqueous solution, which is made by adding the powder to warm water in the proportion of 15 grains to the quart, and shaken vigorously for five minutes, after which it is allowed to stand for about two hours.

Dental Uses.—Acetozone is an efficient and safe antiseptic for the mouth; also for disinfecting root canals and the pus pockets of pyorrhœa. It also possesses great value as a bleaching agent for discolored teeth, especially when the discoloration is due to organic stains. When employing acetozone as a bleaching agent decomposed tissue should be thoroughly removed, the carious cavity cleansed and the powdered acetozone sealed in the tooth with adhesive wax, and allowed to remain for 24 to 48 hours. When introducing it into a root canal, the apex should be filled with chloro-percha. Gutta percha is used to confine the powder in the carious cavity as it will penetrate the zinc cements. When the tooth is greatly discolored the powdered acetozone should be renewed after an interval of four or five days. The powder moistened and packed into the cavity of a carious tooth and secured by a pledget of cotton saturated with gum mastic or other resinous solution is recommended as a preliminary

treatment for such conditions. Acetozone is perfectly harmless to mucous membrane, as it is non-irritating. It is used in 1/10 to 1/100 per cent. solution.

ACIDUM ACETICUM—ACETIC ACID.

Formula.—$C_2H_4O_2$, or conveniently written $HC_2H_3O_2$.

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

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

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

Dose.—Of acetic acid, gtt. iij to x. Of dilute acetic acid, ℥j to ij.

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

Dental Uses.—Acetic acid is externally employed in indolent ulcers of the mouth, cancrum oris and scurvy, both locally and internally. It is also applied to fungous growths of gums and dental pulps, the stronger acid being used. In the form of a gargle it is used for inflamed conditions of the mouth and fauces; it is also hemostatic. In the form of glacial acetic acid—*Acidum Aceticum Glaciale* (concentrated acetic acid), it is applied externally as a caustic in fungous growths of gum, dental pulps, etc. In cancerous ulcerations of mucous membrane, it relieves and promotes a healthier condition.

DENTAL FORMULÆ.

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

℞ Acidi acetici . . . . f℥ij
Aquæ . . . . . f℥v
Fiat solution.
SIGNA.—Apply with a camel's-hair brush.

For Inflamed Fauces.

℞ Acidi acetici . . . . f℥ij
Ammonii chloridi . . ℥j
Mellis . . . . . f℥iss
Aquæ . . . . . f℥xij
Fiat gargarysma.

ARSENIC TRIOXIDE—ARSENIOUS ACID.

WHITE OXIDE OF ARSENIC—ARSENIOSUM OXIDUM.

Formula.—As_2O_3.

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

Derivation.—Arsenious Acid is obtained by roasting arsenical ores, and purifying by sublimation. It is colorless and tasteless, and in the form of a fine white powder, which is often adulterated with chalk, lime, etc.; hence it is better to procure it in the solid form or lump, which is of a milk-white color externally, and often perfectly transparent internally. It has no odor or taste, and is therefore liable to be mistaken for more innocent substances, and scarcely any taste, or merely a faint, sweetish impression. It is soluble in 80 parts water and in 500 parts alcohol.

Medical Properties and Action.—Arsenious Acid is caustic, antiseptic, and tonic, and in large doses is a virulent irritant poison, but in doses of one-sixtieth to one-twelfth of a grain, properly administered, is a tonic increasing the appetite and improving the secretions, both in quality and quantity. In large doses, in the form of Fowler's Solution—*Liquor Potassii Arsenitis* (prepared by boiling 64 grains of arsenious acid and bicarbonate of potassium, each in half a fluid ounce of distilled water, then adding 12 fluid ounces more of distilled water, half a fluid ounce of compound spirit of lavender, and afterwards water enough to make the solution measure a pint)—it is a powerful

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

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

Poisonous symptoms have been caused by half a grain of arsenious acid, and fatal effects have followed the administration of two grains, although much larger quantities have been taken with impunity; very large quantities often cause emesis, which removes the substance from the stomach, and thus prevents fatal effects. When the idiosyncrasies of the patient are unknown, it is better to use small doses before beginning with large doses. The quantity of arsenic required to produce a fatal effect varies according to the susceptibilities of the patient and the state of the stomach. Much, however, depends on the idiosyncrasies of the invididual, which differ greatly in different persons. When large quantities are taken, the effects are some-

times manifested on the cerebro-spinal system, death following, from narcotism, in a short time.

The amount of arsenious acid which may be safely introduced into the stomach should never be equaled in an application to the pulp of a tooth. One-twentieth of a grain may be a safe dose medicinally, but a much less quantity is sufficient for devitalizing the pulps of teeth.

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

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

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

Arsenic is eliminated by the liver, kidneys, intestinal canal and bronchial tubes; and it is thought that some of the symptoms produced by it have their origin in the local effects of the poison on the channels of excretion.

The symptoms of gastro-intestinal arsenical poisoning—the

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

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

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

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

Dose.—Of arsenious acid, gr. 1/60 to gr. 1/12, in pills with bread crumb three times a day. Of liquor potassii arsenitis (Fowler's Solution), ♏ij to ♏x, three times a day; each fluid drachm contains half a grain of arsenious acid.

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

Therapeutic Uses.—In intermittent and periodic diseases, such as malaria, neuralgia and spasmodic affections, being of great value in neuralgia, especially when of a malarial type, hemicrania, chronic rheumatism, asthma, whooping-cough, chorea, diseases of the skin, vomiting of pregnancy, hay fever, irritative dyspepsia, uterine affections, bites of venomous snakes, etc. Exter-

nally it is applied to cancerous growths; hypodermically, in cases of local chorea.

Arsenic is also employed medicinally in the forms of arseniate of iron (*Ferri Arsenias*) and arseniate of soda (*Sodæ Arsenias*).

Dental Uses.—The devitalizing power of arsenious acid being far more powerful than its escharotic power, its use for this purpose was first suggested by Dr. Spooner in 1836, to destroy the vitality of the pulps of teeth, for which purpose it is generally combined with either the acetate or sulphate of morphia and sufficient creasote to form a paste, to prevent, or at least mitigate, the extremely painful action of the arsenic when topically applied to living tissue. It was formerly supposed that creasote was a solvent for the arsenic, but this is now denied. Carbolic acid may be substituted for the creasote.

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

The creasote (or carbolic acid), employed in combination with the arsenious acid as a nerve paste, obtunds sensibility, acting as a styptic, antiseptic and escharotic; hence some depend upon this agent alone to modify the action of the arsenic, and dispense with the morphine.

Tannic acid and tincture of aconite are sometimes substituted for the morphine and creasote, or carbolic acid in the preparation of a nerve paste. Arsenious acid is also employed alone, in the form of a dry powder, to devitalize pulps of teeth; but it is not only more painful, but less prompt in its action than when it is combined with other agents. Previous to the application of the arsenical preparation, chloroform, tincture of aconite, sulphate of atropine, cocaine, etc., may be applied to the exposed portion

of the pulp, and the painful effect of the arsenic be thus modified. The spray of rhigolene, or absolute ether, has also been employed for this purpose.

The quantity of arsenious acid to be employed for devitalization will depend upon the structure and class of the tooth, varying from the 1/100, 1/60, 1/40 to the 1/25 of a grain; also the length of time the arsenical preparation should remain in the tooth, as the condition of the pulp and tooth, the age of the patient, the quality of the tooth structure and the susceptibility of the patient should all be considered. While in most cases pulps are readily devitalized by the application of a moderate quantity of the agent, in other cases it appears to be impossible to accomplish this object without extra measures are resorted to. In teeth of a soft, frail structure, owing to an excess of organic matter, the arsenic is rapidly absorbed; but if, on the other hand, the tooth is of a dense structure, the retention of the arsenical preparation for a much longer time may not be attended with any injurious effects, such as peridental inflammation. From twelve to twenty-four hours are generally required to enable the arsenious acid to properly devitalize the pulp of a tooth; the difference in time depending upon the quantity of the acid employed, as well as upon other circumstances already enumerated. To produce a speedy effect, the pulp should be freely exposed by the careful application of the excavator, and the devitalizing agent applied directly to the exposed surface of the organ. Accuracy as to the quantity of the arsenious acid to be employed may be arrived at by having a grain, in the form of the dry powder, divided into forty, sixty, or one hundred parts. A pellet of cotton, on the end of an excavator, may then be saturated with creasote or carbolic acid or, what may be more painless, oil of cloves, and the desired quantity of the powder, being taken up on the pellet, can be placed directly in contact with the exposed surface of the pulp, and secured in the carious cavity by means of a second pellet of cotton, saturated with either sandarach or shellac varnish, a solution of gutta percha and chloroform, wax, or softened gutta percha. To properly secure the arsenical preparation in the cavity of a tooth, a concave disk of thin platinum may be placed over it, and a temporary filling of soft gutta percha, or oxyphosphate of zinc, introduced

into the carious cavity. Many condemn the use of sandarach or other varnish to seal the arsenic into cavities, preferring a filling of denser material, such as softened gutta percha, chloropercha and cotton, zinc cement, etc., to confine the arsenic more securely. If the arsenic is allowed to escape into the gum it will cause necrosis—arsenical necrosis. As a precaution, after the arsenic is sealed in the tooth-cavity, a pledget of cotton saturated with syrup iron chloride (Weld's syrup) and dipped into sodium bicarbonate, should be placed around the tooth between it and the adjoining teeth, which will render any excess of arsenic harmless to the gum tissue. (See Arsenical Necrosis.)

Dr. James Truman suggests a mixture of iodoform and arsenious acid as a painless devitalizer under all conditions. It is applied as follows: After placing the rubber dam in position, drying cavity, etc., the amount of the arsenious acid it is proposed to employ is placed upon a glass slide and an equal quantity of iodoform, or an excess is added and a paste made with a five per cent. solution of carbolic acid, and the whole carried to the pulp on a piece of cotton, the size of a pin's head. This is then covered with a gutta percha cap, or one of platinum, and a temporary filling introduced; the latter may consist of softened gutta percha or zinc filling material. Pressure upon the pulp must be avoided.

Some prefer to wound the pulp, so as to draw blood, before the application of the arsenical preparation is made, and thus insure its speedy action. Care is necessary that the arsenic should be completely secured in the carious cavity, and no portion of it come in contact with the parts outside of the tooth. In the case of proximal cavities, a roll of bibulous paper, saturated with sandarach varnish, may be pressed between the teeth, beyond the cavity, and thus prevent the arsenical preparation from coming in contact with the gum and cheek, or gutta percha may be softened and packed against the margin of the gum in such a quantity as will fill the interspace. Failure to observe such precautions may result in violent inflammation involving the alveoli and causing necrosis of the bone. After the devitalization of the pulp has been accomplished, it is necessary that every particle of the arsenic should be removed from the tooth. The effect of permitting the agent to remain in the tooth for a longer time than

is necessary for the devitalization of the pulp only, is peridental inflammation. Where several applications of the arsenical preparation fail to produce the desired devitalization, the resistance thus offered to the influence of the agent may be owing to several causes; a granulated, protective covering, which is formed over the surface of the exposed portion of the pulp, which defends it from the action of the arsenic; or, extraordinary vital power in the pulp, which may be due to the peculiar constitution of the patient, who probably would not be as susceptible to the action of arsenic as the majority of persons are, even if it were administered by the mouth.

Such resistance to the action of the devitalizing agent may be overcome either by the removal of the granulated surface where it exists, or, in cases of non-susceptibility, by puncturing the pulp with a pointed instrument, charged with the arsenical preparation; first taking the precaution to obtund the sensibility of the organ by the application of a benumbing agent. The action of arsenic depends upon both local and systemic conditions. When the capillaries of the pulp are congested as a result of the inflammation, the absorption of the agent is prevented or retarded, and it acts chemically upon the superficial tissue of the exposed portion of the pulp and causes pain, rendering it necessary to relieve the congestion before the nerve tissue can be primarily affected. In case of a lymphatic temperament, characterized by low vital power and excess of fluids in the tissues, the arsenic is readily absorbed and devitalization speedily results; whereas in cases where there is great nerve power or excessive nervous irritability, the susceptibility of the tissues to its influence is very feeble, and the devitalization of the pulp is difficult and sometimes impossible, unless repeated applications are made.

It is not considered advisable to apply arsenious acid to a dental pulp in an acute stage of inflammation, and the method generally pursued in such cases is to remove the loose matter in the cavity, first applying the rubber dam, and relieve the congestion by slightly puncturing the pulp so as to cause a slight hemorrhage. Then apply an anodyne, such as oil of cassia, oil of cloves, eugenol, terpinol, or other agent of like properties. This should be carefully sealed in the cavity, without pressure being made upon the pulp, for from one to three days, according to the

degree of inflammation existing in the parts. At the expiration of such time, the dressing is removed, and if the inflammation has subsided, as is shown by the symptoms presented during the period the dressing has remained in the tooth, an application of arsenious acid may be made. Upon the removal of the arsenic, an application of tannin and glycerin should be made in order to harden the devitalized pulp and render its removal easy in the form of an entire mass; then apply some efficient antiseptic dressing to pulp-canal, first washing out with peroxide of hydrogen. The use of dialysed iron is also recommended, after the removal of the arsenic, as it is not always certain that the latter agent has been carefully applied. The dialysed iron is introduced into the cavity on a piece of wood. The cavity should be kept free of moisture from the time of the application of the arsenic up to the time of the application of the dialysed iron.

When arsenious acid is applied to the surface of an exposed pulp, its first effect is stimulating, followed by paralysis of the sensory nerves, inflammation being excited the degree of which depends upon the quantity of arsenious acid employed. After the stimulating effect passes off the arsenic is gradually absorbed and the pulp slowly dies. Too large a quantity of the arsenic will cause violent inflammatory action, increase the congestion and prevent the pulp from absorbing the agent; and experience has shown that recently exposed pulps are more readily devitalized by arsenious acid than those which have been exposed for a considerable time. It is therefore advisable to employ minute quantities of arsenic as a devitalizing agent, and to avoid pressure on the pulp when applying it, so that the pain occasioned by its action may be limited to the space of one hour on an average. The danger of an excess of arsenic passing through the apical foramen of the root to the peridental membrane must always be guarded against by carefully regulating the quantity of the agent; on the other hand all extraneous matters that will interfere with the action and application of the arsenic to the exposed surface of the pulp must be removed, or irritation and pain and not devitalization will result. For the application of arsenious acid to the surface of a fractured tooth, where it is difficult to retain it, the filling may be ligatured in place, after being

covered with a thin layer of gutta percha. Dr. E. C. Kirk uses for such a purpose surgeon's rubber plaster, carrying it around the tooth. Elastic caps are now made to secure devitalizing mixtures in isolated and fractured teeth. One-sixteenth of a grain of arsenic is sufficient to devitalize a pulp in 48 hours.

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

When arsenious acid comes in contact with the soft tissues of the mouth, the result of careless application, its irritating effects become apparent in from twelve to twenty-four hours, beginning with a slight soreness and some congestion. Small ulcers then appear which increase in depth, but are not attended with much pain, unless the agent penetrates to the periosteum. In such case the parts involved eventually become quite dark in color, and sloughing occurs to some extent, and in severe cases necrosis of bone may result, a condition which is known as *arsenical necrosis*. Dr. Faught suggests the following treatment: "Wherever practicable, the soft tissues should be curetted. Scarify freely, and then touch the wound with muriated tincture of iron; then cauterize it with carbolic acid or iodine, and, if need be, stimulate further in a few days with another application of the same." Dr. J. A. Johnson recommends in the treatment of arsenical stomatitis, the use of peroxide of hydrogen, and as a mouth-wash every hour, sulphate of zinc gr. ijss, water ℥j, or a solution of glycerite of tannin, and, internally, iodide of potassium, five grains, three times a day. (*See Arsenical Necrosis, Prevention and Treatment.*)

DENTAL FORMULÆ.

For Devitalizing Pulps of Teeth.

DR. FLAGG.

℞ Acidi arseniosi . . . gr.j
Morphinæ acetatis . . gr.ij
Acidi carbolici . . . gtt.iij. M.
Fiat massa.

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

DR. PIERCE.

℞ Acidi arseniosi . . . gr.x
Morphinæ sulphatis . gr.xx
Creasoti . . . . . q.s.
To make a thick paste.

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

DR. GARRETTSON.

℞ Acidi arseniosi . . .
Morphinæ acetatis . āā gr.x
Creasoti . . . . . q.s.
To make a thick paste.

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

If a very irritable condition is present, sulphate of atrophia may be substituted for morphia.

DR. HOLLANDER.

℞ Acidi arseniosi . . . gr.xij
Morphinæ acetatis gr.ij
Olei caryophylli . . . gtt.iv
Creasoti . . . . . q.s.
Ut fiat pasta. . . .

℞ Acidi arseniosi . . . gr.v
Acidi tannici . . . . gr.x
Tincturæ aconiti . . q.s.
To make a thick paste.

SIGNA.—To remain 24 hours.

DR. J. D. WHITE.

℞ Acidi arseniosi . . . gr.ij
Morphinæ sulphatis . gr.j
Creasoti . . . . . q.s.
Fiat massa.

SIGNA.—To remain from 12 to 24 hours.

℞ Acidi arseniosi . . . gr.xx
Morphinæ acetatis . . gr.x
Creasoti . . . . . q.s.
To make a thick paste.

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

℞ Acidi arseniosi . . . gr.x
Morphinæ acetatis . . gr.xl
Creasoti, vel acidi carbolici . . . . . q.s.
To make a thick paste.

SIGNA.—To remain 12 to 24 hours.

DR. E. C. KIRK.

℞ Acidi arseniosi . . .
Cocaini hydrochloratis āā gr.xx
Menthol cryst . . . gr.v
Glycerini . . . . enough to make a stiff paste. M.

SIGNA.—Use the desired quantity, and secure it with a lead cap covered with gutta percha.

℞ Acidi arseniosi . . . 1 part
Cocaine hydrochloras 4 parts
Lanolin . . . . . 5 parts. M.

SIGNA.—To remain 24 hours.

For Painless Devitalization.

℞ Acidi arseniosi . . . gr.1/60
Olei caryophilli . . enough to make a paste. M.

Or a pledget of cotton may be saturated with the oil of cloves and the arsenious acid taken up on this and applied to the pulp.

Devitalizing Fibre.

℞ Absorbent cotton . . (cross-cut fine.)
Acidi arseniosi . . . gr.v
Acidi tannici . . . . gr.ij
Morphinæ acetas . . gr.x
Acidi carbolic (ol.) . . q.s. for a thin paste.

Reduce the cotton by cutting and cross-cutting to a soft fine fuzz, then incorporate it with the above mixture; dry and separate into small pieces for convenient application.

Or arsenic, morphine and cinnamon applied to cotton in same manner as above.

Devitalizing Pulps of Teeth.

DR. A. W. HARLAN.

First apply to point of exposure vinum opii or any anodyne (not carbolic acid) for a minute or two, then use the following:

℞ Acidi arseniosi . . . ℥j
Hydrochlorate of cocaine . . . . . ℥ij
Lanolin . . . . . ad.q.s.
To make a stiff paste.

SIGNA.—Apply a small quantity to the exposure on a little square of gummed paper about 1/16 of an inch in size; this should be covered with a pellet of cotton saturated with liquid vaseline and the cavity filled with soft gutta percha, or paste of oxyphosphate of zinc. This application should remain 48 hours in the case of an adult; 24 hours in case of a patient under 21 and more than 12 years of age; and 8 to 12 hours in case of a patient under 12 years of age.

For Destroying and Removing Pulps

DR. A. W. HARLAN.

℞ Acidi arseniosi . . . gr.xc
Cocaini hydrochlor. . gr.x
Iodoformi . . . . gr.v to vij
Either oil of cloves or oil of cassia . . . q.s.
To form a stiff paste.

Apply 1/60 grain to the pulp and allow it to remain 48 hours. Seal cavity with gutta percha, when the dressing is removed keep cavity dry, and wash it with dialysed iron, and apply alcoholic solution of tannin. Seal cavity for 8 days, when the pulp may be removed painlessly. The root may be filled at once.

For Devitalizing Pulps of Teeth.

DR. I. P. BUCKLEY.

℞ Arseni trioxidi . . . ℥j
Cocainæ . . . . . gr.xx
Menthol . . . . . gr.v
Lanolini, ... q.s.
Ft. stiff paste

SIGNA.—Apply a small amount to the dentine immediately over the pulp.

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

The following reagents will detect it when it is in aqueous

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

Reinsch's Test consists in boiling the suspected material with hydrochloric acid and clean copper foil, when, if any arsenic is present, the copper foil becomes coated with gray metallic arsenic.

COBALT.—*Cobaltum* (*Formula*, Co)—is a metal chiefly found in combination with arsenic, either in the form of the arsenide (*tin-white cobalt*), or as gray cobalt ore, with sulphur and arsenic. The late Dr. Robert Arthur, at one time, preferred cobalt as a devitalizing agent to arsenious acid, being of the opinion that less irritation followed its action, and consequently greater immunity from peridental inflammation; afterwards, however, he found it less reliable than arsenious acid. At the present time cobalt is not considered to be any safer than arsenic; it is also less prompt in its action as a devitalizing agent.

ACIDUM BENZOICUM—BENZOIC ACID.

Formula.—$C_7H_6O_2 = C_6H_5—CO,OH$.

Derivation.—Benzoic acid is obtained from benzoin (a balsamic resin, which exudes from the incised stem of a tree of Sumatra, Java, Borneo and Siam) either by sublimation or by the action of alkalies; it is also made from hippuric acid. It is in the form of white, feathery crystals of silky lustre, a peculiar, agreeable odor, and warm, acidulous taste. The fixed oils also dissolve it. From solution it crystallizes in transparent prisms. It is also inflammable. Benzoic acid is but slightly soluble in water requiring 500 parts; the addition of borax will render it more soluble; it is also more soluble in warm or boiling water; it is

very soluble in alcohol, solutions of potassa, soda, ammonia, lime and concentrated sulphuric and nitric acids.

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

Therapeutic Uses.—Benzoic acid is employed in chronic cystitis, gout, calculous diseases, jaundice, incontinence of urine in children, etc.

Dose.—Gr. x.

Dental Uses.—Benzoic acid is used as a mouth-wash for diseases of the oral mucous membrane in solution—℥ij or more to ℥ij of water; also as an injection in fractures of the jaws where the mouth cannot be opened to any extent. It may also be employed as an antiseptic in suppurating and gangrenous conditions of the pulps of teeth and mucous membrane; also as a local hemostatic in combination with powdered alum. It forms one of the ingredients of Dr. Chapin A. Harris' Gum Wash. Dr. W. D. Miller asserted that benzoic acid and salicylic acid are the most efficient antiseptic mouth-washes, when used in 1 per cent. solution, but as they are both acid in reaction, the addition of 1 per cent. of borax will render them alkaline.

The tinctures of benzoin are employed in the treatment of unhealthy and sloughing wounds, flabby granulations, foul ulcers, as they destroy the fetor and stimulate to a more healthy growth. The compound tincture combined with the tinctures of iodine, aconite, and canabis indica, forms an excellent counter-irritant for incipient periodontitis, pulpitis, alveolar pyorrhœa, etc., etc. In the antiseptic employment of benzoic acid, it may be used as a substitute for boracic and salicylic acids. The addition of borax will increase its solubility in water.

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

Benzoated lard, when employed in the preparation of oint

ments, prevents chemical change, such as rancidity or acridity. It is prepared by digesting, at a moderate heat, ℥ij of powdered benzoin with a pound of lard.

Antiseptic Mouth-wash.

DR. W. D. MILLER.

℞ Acidi benzoici . . . . . 3.
Tinct. eucalypti . . . . . 15.
Alcoholis . . . . . 100.
Ol. Menth. pip 0.75

For an Antiseptic and Disinfectant Mouth-wash.

DR. L. P. BETHEL.

℞ Benzoic acid
Orris root
Cinnamon, pv., āā . . . . . 1/4 oz
Soap bark 2–oz
Tannic acid . . . . . 1 dr
Borax gr.20
Ol. wintergreen . . . . . 30 ♏
Ol. peppermint 1dr
Cochineal . . . . . 3/4 dr
Sugar. 4–oz
Alcohol 12–oz
Water . . . . . 20–oz M.

Macerate 6 days and filter.

SIGNA.—For rinsing purposes 6 or 8 drops in half a glass of water. In stronger solution for inflammation and pain after extraction.

For a Mouth-wash.

Acidi benzoici . . . . . gr.xv
Sodii boratis . . . . . ℥jss
Aquæ . . . . . f.℥iij. M.

LISTERINE, the formula of which is thyme, eucalyptus, baptisia, gaultheria, and mentha arvensis, in combination, each fluid drachm also containing two grains of benzo-boracic acid, is largely employed as an antiseptic, deodorizer, and disinfectant, in surgical practice, in the form of a lotion, a gargle, a dressing, or an injection. In dental practice, listerine is reliable in inflammations and ulcerations of mucous membrane, and wounds of the mouth, in the form of a lotion or dressing; for alveolar abscesses, necrosis and caries of maxillary bones, in the form of injections

and lotions; after the extraction of teeth, as a mouth-wash; and for offensive breath, as a gargle. It may be employed in its full strength, or in various degrees of dilution with water.

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

For Stomatitis of Dentition.

℞ Listerine . . . . . ℥j
Syr. simplicis . . . ℥vij M.
℞ Listerine . . . . . ℥j
Glycerine . . . . . ℥ss
Water . . q.s. ad. ℥ij M.
SIGNA.—A teaspoonful every 2 or 4 hours after nursing or feeding.

For Sore Mouth of Nursing Women.

℞ Listerine
Glycerine . . . . . āā ℥vj
Rose water . . . . . ℥ijss M.
SIGNA.—Use as a mouth-wash.

Local Anesthetic.

DR. L. P. BETHEL.

℞ Listerine . . . . . ℥ij
Carbolic acid (crystals) . . . . . gr.x
Gum camphor . . . . . gr.viij
Iodoform . . . . . ℥ss
Pond's ext. hammamelis . . . . . ℥ij M.
SIGNA.—Used hypodermically.

ACIDUM BORICUM—BORIC ACID—BORACIC ACID.

Formula.—H_3BO_3.

Derivation.—Boric acid, formerly called Boracic Acid, is obtained artificially by decomposing a hot saturated solution of borax with sulphuric acid, which unites with the soda to form sulphate of soda, and liberates the acid. It is in the form of white, shining crystals, of a scaly nature. It is soluble in 26.6 parts of cold water, in three parts of warm water, and in 15 parts of alcohol and 10 parts of glycerin.

Medical Properties and Action.—Boric acid is antiseptic and deodorant. It destroys minute organisms, and arrests fermentation and putrefactive decomposition, and is said to be a more effective antiseptic than carbolic acid, and less irritating than salicylic acid.

Therapeutic Uses.—It is locally employed as a dressing for

wounds, ulcers, burns, scalds, skin-grafting, etc., as it is non-irritating, and lessens suppuration, and prevents decomposition. A four per cent. aqueous solution is an efficient antiseptic eye-wash. Boric acid is employed in all the forms and combinations in which carbolic and salicylic acids are used by the antiseptic method, in the form of a saturated solution.

Boric Lint is made by steeping lint in a saturated solution of boric acid at the boiling point.

Dose.—Of boric acid, gr. viij to xvj. It does not cause any disturbance of the stomach, and is eliminated in the urine.

Boro-glyceride is composed of boric acid 62 parts, and glycerine 92 parts, each gently heated over a water bath and the boric acid gradually added to the glycerine, and the heat continued until 54 parts, or three molecules of water are driven off. It is amber-colored and very friable, and proves to be a valuable antiseptic.

Boro-glycerine has an acid, pungent taste, and an astringent effect on mucous membranes, and is free from some of the objections to the use of the boric acid powders. (See Glycerine for Glyceroborates of Sodium and Calcium.)

Boric Ointment is composed of boric acid, 1 part; paraffin, 2 parts; almond oil, 2 parts. When used it should be mixed with a little glycerine.

Mel Sodii Boratis.—Honey of Borax—is composed of borax, 60 grains; honey, 1 troy ounce.

Borolyptol.—Antiseptic and germicidal. Composed of aceto-boro-glyceride, formaldehyde, pinus pumilis, eucalyptus, myrrh, storax and benzoin. Employed externally and internally. Dose for internal use, ʒij.

Dental Uses.—Boric acid may be employed as an antiseptic in all the forms and combinations in which carbolic and salicylic acids are used, and when it is combined with sulphite of soda the compound forms a valuable preparation for bleaching discolored teeth. (See Sulphite of Soda).

A four per cent. saturated aqueous solution is an efficient antiseptic wash, and can be safely applied to the most delicate tissues without injury.

Boric acid in a ten per cent. solution may be used with benefit in the form of an injection into suppurating cavities, necrosis and caries of bone, etc. As a mouth-wash and gargle it is employed

in a solution composed of twenty grains to the ounce of water. Combined with glycerine in the form of boro-glyceride, a valuable application is secured for antiseptic dressings and injections. One part of boric acid in 130 of water is used as a germicide.

For the sterilization of mucous surfaces a saturated aqueous solution is commonly employed. Boric acid is also an ingredient of some dentifrices.

For Alveolar Pyorrhœa.

℞ Creta preparata . . . ℥j
Acidi Borici . . . . ℥j M.

Signa.—Apply this powder to gums about necks ofteeth, after all deposits have been thoroughly removed, and aromatic sulphuric acid injected.

For Chapped Lips and Abrasions.)

℞ Acidi borici . . . . 2 parts
Vaselin . . . . . 30 parts
Glycerini . . . . . 3 parts
Attar of roses, for perfume, a few drops, if used as a lip salve.

Antiseptic Mouth Wash.

℞ Boric acid . . . . . ℥ss
Carbolic acid . . . gr.xv
Thymol . . . . . gr.iv
Water . . . . . Oj M.

Mouth Wash.

℞ Boro-glycerine . . . ℥j
Carbolic acid . . . ℥j
Water . . . . . ℥xvj

For Capping Exposed Pulps.

℞ Acidi borici
White wax . . āā 1 part
Oil sweet almonds
Paraffin . . . . . āā 2 parts M.

For Aphthous Ulcerations of Mouth, Fissured Tongue, Abrasions by Artificial Dentures, etc.

Dr. C. N. Peirce.

℞ Acidi borici . . . . gr.lxiv
Olei gaultheriæ . . . f℥ss
Glycerini . . . . . f℥iv
Alcoholis . . . . . f℥j
Aquæ enough to make 4 ounces. M.

M. *Temporary Capping for Exposed Pulps.*

Dr. H. Milling.

℞ Boric acid
White wax . . . . āā 1 part
Oil of sweet almonds
Paraffin . . . . . āā 2 parts

Antiseptic Solution.

Thiersh.

℞ Acidi borici gr.76
Acidi salicyli . . . . gr.xvj
Aquæ ferventis . . . Oj. M.

Antiseptic Mouth Wash.

℞ Boric acid . . . . . ℥vij
Phenic acid . . . . gr.xv
Thymol . . . . . gr.viij
Essence peppermint . gtt.xx
Tinct. anise . . . . ℥ijss
Water . . . . . Oij M.

For Eczema, etc.

℞ Acidi boraci . . . . gr.viij
Aquæ destillatæ . . . ℥j M.

Sig.—Use as a lotion.

Dobell's Solution—Liquor Sodii Boratis Compositus.

℞ Sodii boratis . . . . ℥iv
Sodii bicarbonatis . . ℥iv
Acidi carbolici (crystals) . . . . . gr.xlv
Glycerini . . . . . f.℥j
Aquæ . . . . q.s. ad Oij.

Signa.—Use as an antiseptic wash.

ACIDUM CARBOLICUM—CARBOLIC ACID.

PHENIC ACID; PHENYLIC ALCOHOL; PHENOL.

Formula.—C_6H_5OH.

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

When pure, it is in the form of colorless acicular, interlacing crystals, which at 95° F. become an oily liquid, possessing a strong tarry odor and taste, closely resembling creasote, having similar characters and properties, although it is a different substance. In a warm temperature or by the addition of 5 to 10 per cent. of water, the crystals of carbolic acid liquefy. Much of what is called creasote is nothing but impure carbolic acid (*Acidum Carbolicum Impurum*), combined with two other substances, similar in constitution, and known as *creasole* and *phosole*.

Chemically considered, carbolic acid is an alcohol rather than an acid, and its crystals readily absorb moisture on exposure to the air, and are thus liquefied. It is caustic, disinfectant and antiseptic; also a local anesthetic.

It crystallizes at 70° F., and becomes liquid at from 90° to 95° F., and fuses at 93° to 106°. It is freely soluble in alcohol, ether, chloroform, glycerine and the essential oils. When carbolic acid is liquefied and discolored by exposure, it is difficult to detect it from creasote, as it possesses the same odor, taste, caustic properties, and a like affinity for albumen. Carbolic acid is soluble in from twenty to twenty-three parts of water, the purest being the most soluble. A small quantity of water will convert it into the liquid state, but will not dissolve it. Water dissolves six per cent. of carbolic acid and five parts dissolve in one part of alcohol; four in one part of ether; three in one part of chloroform; seven in two parts of glycerine, and four in seven parts of olive oil. It is also soluble in carbon disulphide, benzol and fixed and volatile oils. The best quality of carbolic acid contains two per cent. of water and should be hard and dry, with no odor of creasote nor of volatile sulphur compounds. Crystallized carbolic acid may be dissolved by a small quantity of

cologne water; and to prevent recrystallization and prepare it for use (in the form of injections, for example), the bottle containing it should be warmed by immersion in hot water, until it becomes fluid, and about five per cent. of rectified alcohol, or a few drops of glycerine, be added.

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

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

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

Its powers as an antiseptic and germicide are not now considered to be equal to those of some other substances, such as bichloride of mercury, iodine, aristol, etc., although it is yet regarded as a useful and important agent. It is irritant to the skin and other tissues, and capable of being absorbed to a dangerous amount. Eisentein regards carbolic acid as an antipyretic as inferior to salicylic acid, and others regard boric acid as possessing equal antiseptic properties. As a local anæsthetic, carbolic acid exerts a very soothing influence upon painful tissues; hence it is beneficial in odontalgia, and for pulp dressing. On account of its solubility, a variety of solutions of special value can be formed with it, which are especially serviceable as antiseptic applications.

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

Its nauseous odor and taste and its caustic action render it objectionable, unless greatly diluted, for internal administration.

To obviate such objections, it is recommended to use it in the form of sulpho-carbolates.

When applied to the skin or to mucous membrane, it produces a burning sensation, of short duration, and the eschar is at first whitish, afterward becoming brown or black, and surrounded by a zone of inflammatory redness; and, notwithstanding its power to coagulate albumen, is rapidly diffused into the blood. Strong alcohol applied to the mucous membrane whitened by carbolic acid will restore the color, and diminish the corrosive action. Carbolic acid exists in the blood as a carbolate; and the blood itself does not appear to undergo any change in its corpuscular elements. It is in part consumed in the body, and the products of its combustion are excreted in the urine. Solutions of carbolic acid of adequate strength will check suppuration, and correct the fetor of ulcers, and has a beneficial effect on bone as well as on the soft tissues in necrosis, etc.

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

Dose.—Of crystallized carbolic acid, gr. 1/4 to gr. j, largely diluted. A better form, however, is *one drop* of the crystallized acid, liquefied by heat, in one ounce of mucilage, three times a day. The dose of glycerite of carbolic acid (*Glyceritum Acini Carbolici*), made by rubbing together ℥ij of carbolic acid with Oss of glycerine, is ♏iv. Antidotes: Soluble alkaline sulphates after emesis; raw white of egg; stimulants.

The dose of carbolic acid water (*Aqua Acidi Carbolici*), f℥x; of the glycerite, dissolved in distilled water, enough to make the mixture measure a pint, the dose is f℥ss to f℥j.

Impure carbolic acid is employed for disinfectant purposes.

Ointment of carbolic acid (*Unguentum Acidi Carbolici*)—carbolic acid, ℥j; lard, ℥j.

Sulphophenol.—Sulpho-carbolic acid, C_6H_4 (OH) (SO_2OH) =

$C_6H_6SO_4$, is produced by the action of sulphuric acid on phenol, and is considered to be a very efficient antiseptic and disinfectant. The addition of acids, particularly sulphuric, to crude carbolic acid of different strengths, increases its antiseptic and disinfectant properties, and considerably increases its solubility. Twenty-five per cent. of crude carbolic acid, mixed with an equal quantity of concentrated crude sulphuric acid, gives the best results, and renders it a cheap and effective disinfectant and sterilizer.

Aseptol, crude sulphophenol (sulpho-carbo orthoxyphenyl-sulphurous acid), is a syrupy rose-colored volatile liquid with a strong odor, and a non-irritant action. It readily dissolves in every proportion of water, alcohol and glycerine. Although it is more acid than carbolic acid, yet it is less caustic, and directly combines with bases. It is non-toxic, anti-fermenting, anti-putrid, and its disinfecting properties are more energetic than those of carbolic and salicylic acids. It can readily be combined with the essential oils. It is recommended as a substitute for carbolic acid.

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

Sulpho-carbolates of sodium, potassium, magnesium, calcium and quinia are employed as antiseptics in cholera and zymotic diseases generally.

Dental Uses.—Carbolic acid being antiseptic, styptic, escharotic, stimulant and sedative, or narcotic, and anæsthetic (local) is a valuable agent in dental therapeutics. It has been employed as an application to carious dentine, to obtund sensibility and arrest putrefactive changes in the devitalized structure, and to coagulate the albuminous elements at the end of the dentinal tubuli.

But it is now generally conceded that there are other agents which are more permanent in their action as antiseptics, and hence carbolic acid, it is claimed, should not be introduced into root-canals permanently, as silico-fluoride of sodium, boro-glycerine, aristol, oil of cloves, cassia, cinnamon, myrtol, etc., are far

more powerful, with better stimulating, antiseptic and disinfectant properties, and do not possess the coagulating property of carbolic acid, nor clog a delicate canal or destroy the tissues to which they are applied. Carbolic acid relieves odontalgia when applied to the surface of an exposed and painful pulp, and will devitalize the pulps of deciduous teeth. It is also invaluable in the treatment of alveolar abscesses; and in combination with iodine or other agents it is often employed with beneficial effects in the treatment of periodontitis. When employed in the treatment of alveolar abscess, as an antiseptic, although the discharge of pus may be increased for a short time after its application there is soon manifested a decided diminution in the quantity secreted. When applied to a suppurating pulp it arrests putrefaction, and induces a healthy action without irritation. It is also a valuable antiseptic application in ulcerations of the mucous membrane of the mouth, gangrenous conditions and mercurial stomatitis; for such purposes it is combined with glycerine and other agents. Applied to exposed pulps, it forms by its escharotic action, an eschar, which some regard as conducive to the recovery of the organ, while others regard the quiescent state it produces as an indication of the degeneration of the pulp, and hence prefer to use it in a diluted form, for the same object, objecting to its employment in its pure state, on account of its escharotic or caustic action. Pure carbolic acid is also employed to destroy the pulps of deciduous teeth.

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

Oil of cloves, when added to an equal quantity of carbolic acid, will disguise, to some extent, its taste and odor. It can also be perfumed by adding to 1 part of carbolic acid 3 parts of oil of lemon and 100 parts of alcohol (36 degrees). Carbolic acid is also employed to check the hemorrhage resulting from the application of leeches to the mucous membrane of the mouth. When applied to an ulcerated surface, it should be repeated, as pus is formed or fungous growths appear; and having formed an eschar when applied to an exposed pulp, it should not be re-

peated until the eschar is detached from the surface. It has also been employed in the form of hypodermic injections, for the relief of neuralgia. Pure carbolic acid is used for obtunding sensitive dentine, and for disinfecting root-canals in alveolar abscess, and in ulcerous stomatitis.

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

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

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

In all fetid discharges from the mouth, throat, etc., carbolic acid, combined with glycerine or an aqueous solution, may be used with advantage. The pure acid is employed for bathing cavities in teeth, preparatory to the introduction of the filling material, for its effect on sensitive or softened dentine and low organisms, although other agents prove more effective as germicides. Carbolic acid, combined with glycerine and rose water, forms an antiseptic mouth-wash; and when prepared chalk is added to the combination, it forms a tooth-paste.

For use as a disinfectant, the form of carbolic acid which contains about ninety-four per cent. of the pure acid and known as "carbolic acid No. 4," is the best, and it may be used as an antiseptic in the following strength: for lotions or sponges, 2 1/2 per cent. in water; for spray or vapor, 5 per cent. in water; for a dressing, 5 per cent. in olive oil. Carbolate of potash (unofficial—Robinson's remedy) is composed of equal parts of carbolic acid and caustic potassa rubbed together; it is employed in pyorrhœa alveolaris and hyper-sensitive dentine. Carbolic acid one-third and potassa fusa two-thirds is escharotic, anæsthetic, obtundent and disinfectant; such a combination causes a definite slough and is useful on suppurating surfaces, sloughing ulcers and dead tissue.

Synthetic Carbolic Acid.—Hitherto all carbolic acid used in medicine has been prepared from coal-tar. But such an acid is never quite pure, always containing impurities derived from the

coal-tar. Synthetic carbolic acid is produced during the process of sulphonizing benzol and subsequent fusion of the benzol-sulphonate with caustic alkali. The most characteristic difference between it and the acid prepared from coal-tar is the odor, the synthetic acid having a faint "pure" odor not like that of coal-tar, and almost unperceivable in a 5 per cent. aqueous solution, differing in this respect also from the commercial article. Synthetic carbolic acid is in two forms—in a coherent crystalline mass, and in loose crystals. Experiments made by Dr. Ohlmueller, of the German Health Department, showed that the synthetic acid diminished the life activity of the bacteria experimented on rather less than the older acid, but that the difference was so small that the two kinds might be considered to be practically of the same value. One of the advantages claimed for synthetic carbolic acid it its greater solubility in water, thus enabling the operator to use it in greater strength without diminishing its causticity.

Phenol Sodique (unofficial) is a solution of sodium carbolate, and is extensively employed in dental practice. (See Phenate of Soda.) It is composed of pure melted carbolic acid, 5 parts; solution of caustic soda (of a specific gravity of 1.332), 1 part; distilled water, 5 parts. Mix.

Carbolate of Camphor is composed of carbolic acid, by weight, one part, and camphor, by weight, three parts.

DENTAL FORMULÆ.

A Lotion for Soft and Spongy Gums.

℞ Acidi carbolici . . . gr.xx
Spiriti rectificati (alcohol) . . . . . ʒij
Aquæ destillatæ . . . ʒvj. M.

It renders the gum less tender and firmer.

An Antiseptic Lotion or Injection.

℞ Acidi carbolici . . . ʒss
Glycerini . . . . . ʒxv. M.

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

A Stimulant and Antiseptic Lotion.

Dr. J. Stocken.

℞ Acidi carbolici . . . ʒj
Glycerini . . . . . ʒiv
Aquæ . . . . . ʒx. M.

Useful in ulceration of the gums and mucous membrane.

For Sensitive Dentine and Alveolar Pyorrhœa.

Dr. J. A. Robinson.

℞ Acidi carbolici . . . (cryst.)
Potassæ caustic . āā partes equal
Misce, by triturating in a mor-

tar until a crystalline paste is formed.

SIGNA.—Apply on a loosely rolled twist of cotton about neck of tooth, for alveolar pyorrhœa. It is known as the "*Robinson Remedy.*"

For Alveolar Pyorrhœa (Riggs' Disease).

℞ Acidi carbolici . . . ♏xxv
Potassæ iodidi . . . gr.v
Zinci chloridi . . . gr.xxv
Alcohol absolut . . ♏xxv
Aq. destillatæ . . . ♏x
Ol. menthæ pip. . . ♏v
Misce et filtra.

SIGNA.—As an injection in pus-pockets of gum.

A Disinfectant Mouth Wash.

DR. J. B. PATRICK.

℞ Acidi carbolici (cryst.)
Glycerini,
Aquæ rosæ . . . āā ℥ij M.

SIGNA.—Five to eight drops in a wineglass of water.

A Stimulant and Antiseptic Mouth Wash.

℞ Acidi carbolici . . . gtt.xx
Glycerini . . . . . ℥iv
Aquæ . . . . . ℥x

SIGNA.—To be used as a gargle.

For Fetid Perspiration.

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

For Parasitic Skin Diseases.

℞ Acidi carbolici . . . ℥j
Glycerini . . . . . ℥j. M.

For Dry Mouth.

H. J. FISH.

℞ Acidi carbolici . . . gtt.x
Glycerini . . . . . ℥j. M.

SIGNA.—Apply on palate of mouth with a soft brush 3 times a day.

For Inhalation in Syphilitic Ulcerations.

℞ Acidi carbolici . . . ℥xxj
Aquæ destillatæ . . . ℥iij M.

SIGNA.—Inhale the vapor. Antiseptic.

A Stimulant and Antiseptic Injection.

℞ Acidi carbolici . . . 1 part
Glycerini . . . . . 30 parts

Useful as an injection in chronic forms of alveolar abscess.

For Odontalgia.

℞ Acidi carbolici,
Chloroform,
Liquid opii,
Vel morphine hydrochloratis . . . . āā ℥ij
Tincturæ benzoini . ℥j. M.

SIGNA.—Apply to exposed surface of pulp, on cotton.

A Stimulant and Antiseptic Lotion or Injection.

PERCY BOULTON.

℞ Acidi carbolici . . . ♏vj
Tincturæ iodi . . . ♏xlv
Glycerini . . . . . ℥j
Aquæ destillatæ . . . ℥v. M.

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

For Itching of the Skin.

℞ Acidi carbolici . . . ℥ij
Glycerini . . . . . ℥j
Aquæ rosæ . . . . ℥viij. M.

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

Antiseptic Solution.

DR. J. P. BUCKLEY.

℞ Acidi carbolici . . . f.℥j
Aquæ menthæ piperitæ . . . . . f.℥vj. M.

A mild, non-irritating antiseptic solution.

For Alveolar Pyorrhœa (Riggs' Disease).

℞ Acidi carbolici . . . ♏v
Spts. vini rectif . . ℥vj
Aq. menthæ pip. . . ℥ij
Ol. anisi . . . . . ♏j
Ol. cinnamon . . . . ♏ss. M.

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

An Antiseptic and Disinfectant Dentifrice.

J. STOCKEN.

℞ Acidi carbolici . . . ♏xxx
Pulvis ossis sepiæ . . ℥ij
Pulvis radicis iridis . ℥ij
Creta Preparatæ . . ℥iij .
Olei caryophylli . . gtt.iij. M.

For a Carbolized Styptic.

℞ Acidi carbolici . . . x parts
Collodii . . . . . c parts
Acidi tannici . . . . v parts
Acidi benzoici . . . v parts. M.

It coagulates blood and albumen, and cicatrizes the tissues.

For Chilblains.

℞ Acidi carbolici . . . ℥j
Tincturæ iodi . . . ℥ij
Acidi tannici . . . . ℥ij
Cerate Simplicis . . ℥iv. M.

Fiat unguentum.

For Odontalgia.

℞ Collodii (flexile) . . . ℥j
Acidi carbolici . . . ℥ij. M.

SIGNA.—Apply to surface of exposed and painful pulp

For Odontalgia.

℞ Acidi carbolici . . . ℥ij
Morphinæ acetatis . . gr.xx. M.

SIGNA.—Apply to surface of exposed pulp, on cotton.

Dressing for Root-Canals and Abscesses.

DR. G. V. BLACK.

℞ Acidi carbolici . . 1 part
Oleum cassiæ . . . 2 parts
Oleum gaultheriæ . 3 parts. M.

Dressing for Children's Teeth.

℞ Acidi carbolici (cryst.) ℥j
Oleum cassiæ . . . . ℥j
Glycerini . . . . . ℥j
Alcoholis . . . . . ℥ij. M.

It quickly relieves pain, and does not nauseate.

For Pain after Extraction.

First wash out cavity with phenol-sodique, then apply on a loosely rolled pellet of cotton the following:

℞ Acid. carbolici glacial . . . . . ℥ij
Liq. Potassæ . . . . . ℥j
Water . . . . . ℥vj. M.

ACIDUM CHROMICUM—CHROMIC ACID.

Formula.—H_2CrO_4.

Derivation.—Chromic acid is obtained in the form of brilliant, deep red, acicular crystals, by the reaction of strong sulphuric

acid upon a solution of bichromate of potash. It is deliquescent, and very soluble in water and alcohol, forming an orange-yellow solution.

Medical Properties and Action.—It is a powerful caustic, decomposing the tissues by rapid oxidation; and although it is very slow and gradual in its action, yet it is deeply penetrating and when its action ceases, sesquioxide of chromium remains. So destructive is its effect, that small animals are dissolved entirely, bones and all, by it, in fifteen or twenty minutes. On account of its penetrating deeply, without much pain, care is necessary in its use; and when used as a caustic, the surrounding tissues should be well protected. The part on which it acts first becomes yellow, then brown, and ultimately black, and the eschar is detached in from twenty-four to forty-eight hours. It is a powerful oxidizer, and gives up its oxygen readily to organic matter, which it thus dissolves. When in solution, more or less diluted, its action can be modified, according to the effect desired.

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

Dental Uses.—In dental practice chromic acid has been employed for obtunding sensitive dentine; but its most valuable application is for the removal of tumors and morbid growths upon the gums, fungous growths of tooth pulp, etc. When applied to any part of the mouth, the surrounding parts should be carefully protected by folds of lint or strips of adhesive plaster, or the rubber dam. A glass rod, or a gold or platinum wire, should be used for its application. It is also useful in ulceration and recession of the gums, beginning the treatment with a weak solution, and

gradually increasing the strength. It is sometimes combined with glycerine, in which case the latter must be added to the acid drop by drop, in order to avoid explosion. As an obtundent it is useful in the strength of a solution 1 in 40, for relieving the pain of psoriasis and syphilitic affections of the tongue.

DENTAL FORMULA.

For Secondary Syphilitc Ulcers, and Ulceration of Mucous Membrane of Mouth and Tongue.

℞ Acidi chromici . . . . . gr. x
Aquæ . . . . . ℥j. M.
SIGNA.—Paint the diseased parts 3 or 4 times a day, with a camel's-hair brush dipped in the solution.

CRESYLONE.

Cresylone belongs to the phenol group, and is distilled at 76° higher temperature than carbolic acid.

Cresylone is an efficient non-toxic antiseptic, disinfectant and germicide, containing 50 per cent. of cresylic acid. It possesses the germicidal power of carbolic acid, but is safer and more convenient to use. It has no corrosive action on steel or nickel-plated instruments. Its odor is not unpleasant, and it makes a clear solution with water in all proportions. A two per cent. solution of cresylone is employed as a sterilizer for the hands.

Dental Uses.—Besides its use as a sterilizer for instruments and the hands, cresylone is a very useful mouth-wash and disinfectant for root-canals. Cresylone is used as a substitute for carbolic acid, and as a disinfectant and antiseptic in root-canals and abscesses; the solution employed is 1 to 200.

It may be used as a root-filling by dipping the gutta percha cone in pure cresylone which acts as a solvent to the gutta percha and will destroy any septic matter. Cresylone is also an efficient sterilizer for instruments which are placed in a solution of 1 part in 100 of boiling water for one minute: it does not rust or corrode the finest or most delicate instruments.

ACIDUM GALLICUM—GALLIC ACID.

Formula.—$C_7H_6O_5$.

Derivation.—Gallic Acid is obtained from galls by exposing the powder, in water, to the action of the air, at a temperature

of between 60° and 70° F., when the acid is deposited in the form of small, silky, almost colorless crystals, possessing a slightly acid and astringent taste. Gallic acid is soluble in 100 parts of water and 5 parts of alcohol. It is freely soluble in hot water and glycerine.

GALLS, from which gallic acid is prepared, are the excrescences caused by the punctures and deposited ova of a hymenopterous insect on the twigs of the gall oak (*Quercus Infectoria*). Gallic acid is also prepared from tannic acid, and is supposed to act, as styptic, after entering the circulation.

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

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

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

Therapeutic Uses.—Galls are employed in the treatment of chronic diarrhœa, dysentery, leukorrhœa, chronic gonorrhœa and gleet, diseases of the uterus and intermittent fevers, and externally in hemorrhagic disorders, hemorrhoids, relaxation of uvula, hypertrophy of the tonsils, etc. It has been administered internally in the hemorrhagic diathesis and to arrest hemorrhages which cannot be controlled by topical styptics.

Gallic acid is given directly for internal hemorrhage.

Dose.—Of powdered galls, gr. x to gr. xx. The ointment is composed of: powdered galls, gr. lxxx; benzoated lard, ℥j. It is combined with opium in the form of ointment in the proportion of galls, ℥j; powdered opium, gr. xxxij.

Medical Properties and Action.—Gallic acid is a powerful astringent for arresting hemorrhage in which the bleeding vessels must be reached through the circulation. It is also a valuable styptic in cases of hemorrhage depending on a hemorrhagic diathesis, and in the form of a gargle it is very serviceable in acute inflammations of mucous membranes. It is also a strongly deodorizing agent; and, like tannic acid, it is capable of taking oxygen from the blood globules. Internally employed it produces

constipation, which may be prevented by an occasional aperient. Although it is weaker than tannic acid, yet its properties are very similar. It is supposed to be converted into tannic acid in the blood.

Therapeutic Uses.—Ga'lic acid is employed in the treatment of hemorrhagic diseases, in their chronic stages especially, such as hemoptysis, hemorrhage from ulcer of the stomach, hematemesis and hematuria, atonic menorrhagia; also, for the profuse perspirations and excessive expectoration of phthisis, for albuminuria, dyspepsia, chronic diarrhœa and gastric irritation in children, gonorrhœa, gleet, etc. It is also administered in cases of alveolar hemorrhage.

Dose.—Of gallic acid, gr. ij. to gr. v, in pill, every two or three hours.

Glycerite of galic acid (*Glyceritum Acidi Gallici*), for external use, is composed of gallic acid, ℥j; glycerine, ℥iv.

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

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

For hemorrhage following the extraction of teeth, Dr. Bartholomew claims that one teaspoonful of gallic acid in a glass of water, internally administered, never fails.

DENTAL FORMULÆ.

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

℞ Acidi gallici . . . . gr.xl
Liq. sodæ chlorinatæ ℥ij
Glycerini . . . . . ℥ij
Aquæ destillatæ . . . ℥viij. M.

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

For Relaxation of Uvula and Hypertrophy of Tonsils.

℞ Infusi gallæ . . . . ℥vj
Albuminis . . . . . gr.xl. M.

SIGNA.—Use as a gargle.

An Internal Astringent in Hemorrhagic Affections.

℞ Acidi gallici . . . . ℥j
Glycerini . . . . . ℥iv
Aquæ destillatæ . . . ℥vj. M.

SIGNA.—Take ℥j as a dose.

For Alveolar Hemorrhage.

DR. C. W. GLASSINGTON.

Acidi gallici . . . . gr. xx.
Acidi sulphurici . . . ℥j.
Tinct. opii . . . . . ℥iss.
Aquæ . . . . . ℥vj.

SIGNA.—Two tablespoonfuls every 2 hours until bleeding stops.

An Internal Astringent for Dental Hemorrhage.

OTTO ARNOLD.

℞ Acidi gallici . . . . ℥j
Aquæ cinnamon . . ℥ij. M.
SIGNA.—A teaspoonful every hour until bleeding is arrested.

For an Astringent Gargle or Lotion.

℞ Pulveris gallæ . . . ℥ss
Aquæ . . . . . Oj. M.
SIGNA.—As a gargle or lotion in inflamed or ulcerated condition of mucous membrane and gums.

ACIDUM HYDROBROMICUM—HYDROBROMIC ACID.

Formula.—HBr.

Derivation.—Diluted Hydrobromic Acid is prepared by adding ten per cent. of absolute hydrobromic acid to ninety per cent. of water. It is a clear, colorless liquid, having no odor, but a decidedly acid taste and an acid reaction.

Medical Properties and Therapeutic Uses.—Hydrobromic acid is often substituted for the bromides on account of its possessing many of their properties. It is employed in cerebral disorders from overexertion, epilepsy, spasmodic cough, angina pectoris, affections of the heart, as it diminishes its action, to relieve the symptoms of quinine, and also of morphine, migraine or sick headache, neuralgia, spasmodic asthma, etc.

Dose.—♏xx to ℥ij.

Dental Uses.—Diluted Hydrobromic Acid may be employed in facial neuralgia, infantile convulsions due to teething, and to lessen the irritability of the fauces when impressions for obturators and artificial palates are being taken.

ACIDUM HYDROCHLORICUM—HYDROCHLORIC ACID.

MURIATIC ACID—ACIDUM MURIATICUM.

Formula.—HCl. Sp. gr., 1.16.

Derivation.—Hydrochloric or Muriatic Acid is obtained by the action of sulphuric acid on a solution of chloride of sodium or common salt. When pure, it is a transparent, colorless, liquid, but when contaminated with chlorine, iron and other substances,

it has a yellow color. It emits a dense, white vapor, with a pungent odor and a corrosive taste, being an active poison. The antidote is magnesia or soap.

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

Therapeutic Uses.—The dilute hydrochloric acid is internally employed in the treatment of calculous affections, gout, atonic dyspepsia, typhus and typhoid fevers, continued fevers of childhood, syphilis, chronic whooping-cough, phthisis, etc., and externally in diphtheria, ulcerated sore throat, cynanche maligna, etc.

Dose.—Of dilute hydrochloric acid, ♏x to ♏xxx, freely diluted; otherwise, when swallowed, it is highly irritant and corrosive.

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

The strong acid is also employed as a local application in gangrenous stomatitis or cancrum oris, for arresting the ulcerative process; but care is necessary in its use, on account of its powerful action. Combined with equal parts of glycerine it is useful in inflammation and ulceration of the oral mucous membrane; also, the same combination in cases of sloughing will induce a healthy form of inflammation, and to limit its application to the parts on which it is to act, collodion may be applied. For mild cases of inflammation it may be diluted with an equal amount of honey.

In aphthous ulcerations of the mouths of children, it is often a useful application. Being a corrosive poison, the antidotes are a glass of water to dilute the acid, followed by a solution of magnesia, soap or plaster from wall, demulcents, stimulants, and morphine hypodermically.

DENTAL FORMULÆ.

For Aphthæ.

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

For Chronic Inflammation of Mucous Membrane and Gums.

℞ Acidi hydrochlorici diluti . . . . . ♏x
Infusi cinchonæ . . f℥iv
Mellis . . . . . f℥j. M.
Fiat gargarysma.

For Ulceration of Mucous Membrane.

℞ Acidi hydrochlorici diluti . . . . . ℥ij
Glycerini . . . . . ℥iv
Aquæ destillatæ . . . ℥x. M.
SIGNA.—To be used as a gargle.

For Scorbutic Gums.

℞ Acidi hydrochlorici diluti . . . . . ℥ss
Mellis,
Aquæ rosæ . . . āā f℥j. M
SIGNA.—Apply with a camel-hair pencil 3 or 4 times a day.

ACIDUM NITRICUM—NITRIC ACID.

AQUA FORTIS.

Formula.—HNO_3. Sp. gr., 1.420.

Derivation.—Nitric acid is obtained by the action of sulphuric acid upon nitrate of potash or soda. When strong and pure it is colorless, but on account of the presence of nitric peroxide it is generally of a yellow color, and emits acrid, corrosive fumes.

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

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

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

Medical Properties and Physiological Action.—It is an antalkaline, alterative tonic and refrigerant, and has a very direct action

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

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

Dose.—Of diluted nitric acid, gtt. ij–xv, three times a day, diluted with water, and taken through a tube to protect the teeth.

Dental Uses.—The strong acid, when mixed with two parts of hydrochloric acid, is a solvent for gold, and is known as *aqua regia*. It is also employed as one of the most effectual caustics in cancrum oris, the constitution being supported and quinine given at the same time; also for malignant ulcers of the mouth, and for devitalizing pulps of teeth when nearly exposed by mechanical abrasion, care being observed that the part of the surface immediately over the pulp is touched with the acid, and the neighboring parts protected; it is a painful operation, however, and nitrate of silver is preferable. The dilute form is of the strength of 10 per cent.

DENTAL FORMULA.

For Sloughing and Ill-Conditioned Ulcers.

℞ Acidi nitrici . . . . . ♏ l–lx
Aquæ . . . . . Oj. M.
SIGNA.—Apply with a camel-hair brush.

ACIDUM PHOSPHORICUM—PHOSPHORIC ACID.

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

Formula.—H_3PO_4. Sp. gr., 1.056.

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

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

Diluted Phosphoric Acid (10 per cent.) is prepared by boiling phosphorus with nitric acid and distilled water until it is dissolved, evaporating and rediluting it. It may also be obtained by dissolving an ounce of glacial phosphoric acid in three ounces of distilled water, afterward adding forty grains of nitric acid, boiling to a syrup, and diluting with water until the solution measures twelve and a half ounces.

Medical Properties and Physiological Action.—It is tonic and refrigerant, and, in large doses, is a powerful stimulant to the nervous and vascular systems. It can be detected in the blood, owing to its absorption, and, in large doses, is an irritant poison.

Therapeutic Uses.—Diluted phosphoric acid is employed in scrofula, dropsy, hemoptysis, calculous disease, diabetes and cardialgia. The diluted form is a general nerve tonic and is useful in conditions of deficient bone nutrition, being a substitute for pure phosphorus. Externally, it has been employed as a local application in the treatment of caries of the bones and osseous tumors.

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

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

DENTAL FORMULÆ.

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

℞ Acidi phosphor. dilut. 1 part
Aquæ destillatæ 8 to 10 parts. M.

SIGNA.—Apply as a lotion or injection.

For Ulcers Over Carious Bones.

℞ Acidi phosphorici glacialis . . . . . ℥j
Aquæ destillatæ . . . f℥viij
Fiat Solution.

SIGNA.—To be applied on compresses to ulcers situated over carious bones.

Phosphoric Acid in the Anhydrous State consists of one equivalent of phosphorus to five equivalents of oxygen (PO_5), and it is obtained by the direct union of its constituents, which takes place when phosphorus is burned in perfectly dry oxygen gas.

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

Glacial Phosphoric Acid, or monohydrated phosphoric acid, concentrated phosphoric acid, is readily obtained from calcined bones, by first heating them with sulphuric acid, which produces an insoluble superphosphate of lime; then dissolving out the latter salt, and saturating it with carbonate of ammonia, which generates phosphate of ammonia in solution, and finally obtaining the phosphate of ammonia by evaporating it to dryness, and then igniting it in a platinum crucible. The ammonia and all of the water, except one equivalent for each equivalent of the acid, are driven off, and the glacial phosphoric acid remains, the formula of which is HO,PO_5, and contains 11.2 per cent. of water. It is a white, transparent fusible solid, generally in the form of sticks, inodorous and sour to the taste. It slowly deliquesces, and is sparingly soluble in water, but freely soluble in alcohol.

Dental Uses.—Glacial phosphoric acid and white oxide of zinc formed into an anhydrate, give the plastic material for filling teeth, known as oxyphosphate of zinc. The powder or solid portion of this preparation is prepared by packing pure oxide of zinc in a clay crucible and subjecting it to almost a white heat for two hours, when it will have been reduced in bulk fifty per cent. It is then pulverized in a mortar to an almost impalpable powder. The burning of the oxide of zinc colors it to a light

yellow, and it is now in a condition for use, and may be kept in a covered vessel for any length of time.

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

Formulæ for Fletcher's and Weston's preparations of oxyphosphate of zinc filling materials:

FLETCHER'S.

Fluid.	*Solid.*
Phosphoric acid.	Basic oxide of zinc.
Phosphate of alumina.	

WESTON'S.

Fluid.	*Solid.*
Phosphoric acid.	Basic oxide of zinc—80 per cent.
(See *Oxide of Zinc.*)	Silicate of alumina—20 per cent.

Medicated Oxyphosphate Fillings.—Dr. Chas. B. Atkinson claims the following advantages for such filling materials:

First.—A remedial agent in constant contact with the walls of the cavity.

Second.—Germicidal action of the filling on the tissue with which it comes in contact.

Third.—A neutral influence resisting solution.

Fourth.—Increased hardness, varying somewhat with the agent used. The medicaments for oxyphosphate fillings are: 1. Creasote and oil of cloves, equal parts; 2. Eugenol; 3. Deliquesced carbolic acid; 4. Oil of cinnamon; 5. Oil of cloves; 6. Creasote, pure; 7. Creasote, oil of cloves and iodoform; 8. Creolin; 9. Campho-phenique; 10. Potassium chlorate (powdered); 11. Salicylic acid; 12. Camphor (pulverized); 13. Stick sulphur (pulverized); 14. Iodoform; 15. Oil of wintergreen. The first seven have been fairly tested by Dr. Atkinson and were found to be equal in durability, manipulative qualities and time of setting. He employs them also in retaining inlays, in setting retaining-fixtures in pyorrhœa cases, in setting crowns, etc In

capping pulps he always employs a mixture of oxide of zinc, creasote and oil of cloves, and adds a remedial agent to the oxy-phosphate filling. He employs mostly the first named on the list. If the medicament is a liquid he adds about an equal quantity of the medicament and phosphoric acid; if a powder, about equal parts of the medicament and oxide. The proportions may be varied as required. The average time of setting is about ten minutes.

ACIDUM SALICYLICUM—SALICYLIC ACID.

Formula.—$HC_7H_5O_3$.

Derivation.—Salicylic Acid is obtained by combining carbolic acid with caustic soda, and subjecting this compound to dry carbonic acid under the influence of heat, the portion of salicylate of sodium remaining behind after the carbolic acid distills over being saturated, in the form of a hot, aqueous solution, with muriatic acid, which liberates the salicylic acid in fine, white crystals. The crystals are washed, dissolved in hot water, and by re-crystallization, obtained in the form of a powder of a light brown color, which is then bleached until it is quite white; but most of that sold is of a light cream-color with a reddish tinge. The coloring matter, however, which is present, does not interfere with its efficacy. It is sometimes obtained from the product of plants, such as wintergreen. It has no smell, a slight taste, and is soluble in 450 parts of water and 2.4 parts of alcohol and 2 parts of ether and 80 parts of chloroform, also in hot water and glycerine. It can also be obtained from salicin, the vegetable principle existing in willow, poplar, etc., and from oil of gaultheria (wintergreen) and from spiræa ulmariæ (meadow sweet).

Medical Properties and Physiological Action.—Salicylic acid is a powerful antiseptic, and is said to be as effective in small quantities as any other antiseptic, in arresting putrefactive and fermentative processes. When properly reduced in strength it causes no pain or irritation in the parts to which it is applied. It will destroy minute organisms, and a small quantity will arrest vinous fermentation and prevent the decomposition of animal fluids. Although free from any poisonous action when administered in a reasonable quantity, yet in large doses it will cause nausea and

vomiting. It is thought to combine with the soda of the blood, where it is present as a salicylate. It has little or no affinity for cold water; but the addition of certain alkaline salts, such as sodium phosphate, increases its solubility. Combined with sulphite of sodium, which is also antiseptic, and water, a solution is formed which is free from irritating properties and especially applicable to the treatment of zymotic diseases. Glycerine warmed will dissolve 1/50 its weight of salicylic acid, and the solution may then be diluted with water to any desirable extent.

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

Salipyrine.—Prof. Dr. von Hosengeil (Bonn, Germany) claims that the action of antipyrine in such cases of influenza which show no rise of temperature is that of a cardiac poison. Salicyl and quinine have also such action. By combining salicylic acid and antipyrine he claims to have found a preparation which he names *salipyrine*, which has proven itself to be a most excellent specific anti-influenzic remedy in just such cases. The dose he employs is from 15 to 30 grains.

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

Dental Uses.—Salicylic acid is employed in the treatment of suppurating and gangrenous pulps of teeth, in the form of the dry powder introduced into the pulp canals and permitted to remain for several days. An ethereal solution of salicylic acid, introduced on a small piece of punk, has also been employed for the same purpose, where it is difficult to introduce the dry powder; the ether volatilizes in a few minutes. Salicylic acid is also employed with advantage in inflamed conditions of the mucous membrane of the mouth and gums, and in the treatment of aphthæ, thrush and other ulcers, in the form of a solution. For such purposes its combination with powdered cassia or cinnamon, equal parts, is recommended, to be applied with a soft brush. Salicylic acid has also been found efficacious in all in-

flammatory conditions resulting from decayed and dead teeth and roots. It has also been recommended as a dentifrice, in the form of an alcoholic solution of the acid perfumed with oil of gaultheria; but its use for such a purpose is questioned, on account of its softening effect upon the tooth structure. As tannic acid interferes with the action of salicylic acid, these agents should not be used in combination.

DENTAL FORMULÆ.

A Disinfectant Mouth Wash.

℞ Acidi salicylici . . . 1 part
Sodii phosphas . . . 3 parts
Aquæ destillatæ . . 30 parts. M.
SIGNA.—Use as a gargle.

A Disinfectant and Stimulant Mouth Wash.

℞ Acidi salicylici . . . ℥ij
Spiriti vini rectificati ℥x. M.
SIGNA.—Use as a gargle.

For Perspiration of Hands and Feet.

℞ Acidi salicylici . . 3 parts
Magnesii silicat . . 87 parts. M.
SIGNA.—Use in the form of a powder.

An Emollient and Antiseptic Gargle.

℞ Acidi salicylici . . . ℥ij
Sodii boratis . . . . . ℥iij
Glycerini . . . . . ℥iiss
Aquæ destillatæ . . . ℥iij. M.
SIGNA.—Add 1 or 2 drachms to half a pint of warm water.

For Warts.

UNNA.

℞ Acidi salicylici . . . ℥iij
Creasoti . . . . . ℥vj
Ceræ, or Adipis . . āā q.s. to make a firm ointment that will adhere to the skin.

For Burns.

℞ Acidi salicylici . . . ℥j
Olei Olivæ . . . . . ℥viij. M.
SIGNA.—Apply as a lotion.

For Alveolar Pyorrhœa.

℞ Acidi salicylici . . . ℥j
Eucalyptol . . . . ℥vi. M.
SIGNA.—Apply to pockets by means of cotton or a broach.

Antiseptic Mouth Wash.

℞ Acidi Salicylici . . . . . gr. xv
Sodii boratis . . . . . ℥ jss
Aquæ . . . . . f. ℥ iij. M.

Antiseptic Solution

THIERSCH.

℞ Acidi salicylici . . . . . 4 parts.
Acidi borici . . . . . 12 parts
Water . . . . . 1000 parts. M.
Useful as an antiseptic wash and especially during treatment of fractures of maxillæ.

ACIDUM SULPHURICUM—SULPHURIC ACID.

OIL OF VITRIOL.

Formula.—H_2SO_4. Sp. gr., 1.843.

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

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

Diluted Sulphuric Acid.—*Acidum Sulphuricum Dilutum.*

Derivation.—It is prepared by diluting sulpuric acid f℥vij with distilled water f℥lxxvij, and when the mixture has cooled to 60°, by adding more water ℥lxxxiiiss. Sp. gr., 1.094.

Medical Properties and Action.—It is refrigerant, astringent and tonic. It is employed as a refrigerant in fevers; as an astringent for arresting hemorrhage and passive mucous discharges, and as a tonic to improve digestion. As it is very injurious to the teeth, the proper precautions should be observed, as in the case of all acids administered as medicines—such as alkaline gargles used before as well as after their introduction in the mouth, and the use of a glass tube or quill.

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

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

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

Derivation.—Aromatic sulphuric acid is prepared by mixing sulphuric acid f℥iij, with rectified spirit Oij, and adding cinnamon ℥ij, and ginger ℥i 1/4. It is a reddish-brown liquid, with an aromatic odor and a pleasant taste.

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

Therapeutic Uses.—Aromatic sulphuric acid is employed as a substitute for the diluted form in debility with night sweats, loss of appetite during convalescence from fevers, hemoptysis and other hemorrhages, and epidemic dysentery. Externally it is applied to carious bone, ulcers, in the treatment of pyorrhœa alveolaris, especially where there is necrosis of the alveolar walls, when is it applied on cotton packed in the pockets; also in chronic alveolar abscesses. For such purposes it must be kept in the pockets, sinuses and abscesses for several hours in order to insure its full effects. It is also employed locally in cancrum oris and gangrene of the mouth, and largely diluted, it forms an efficient astringent mouth wash in simple stomatitis, etc.

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

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

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

It is a valuable application in pyorrhœa alveolaris (Riggs' disease), and in caries and necrosis of the maxillary bones, as an injection or lotion, as it stimulates the parts to healthy action by

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

Dr. W. H. Atkinson speaks very favorably of the action of aromatic sulphuric acid upon morbid growths and ulcerating surfaces, especially in pockets where the connective tissue has been destroyed and deep chasms exist along the line of teeth, between the cementum and alveolar walls. After drying out such pockets with bibulous paper, drops of aromatic sulphuric acid, in full strength, should be dropped into the open mouth of the pocket until it stands full, on a level with the surface of the gum and teeth. This is repeated when the contents of the pocket are absorbed, again and again; after which the mouth is washed with a saturated solution of bicarbonate of soda in distilled water. After drying the pocket with bibulous paper, a paste of tannin and glycerine, smoothly spread upon several folds of the same paper, is laid over the surface, and the patient directed to use hydronaphthol solution as a mouth wash, frequently during the day. The following day, the pocket is washed out with peroxide of hydrogen, fifteen volume medicinal, until it ceases to bubble; then repeat the application of the aromatic sulphuric acid in the same manner as first described. The hydronaphthol solution should be used frequently, and also a bichloride of mercury solution, 1.1000, three or four times a day, until there is no longer any evidence of pus when the peroxide is injected. Dr. J. R. Callahan recommends a 50 per cent. aqueous solution of sulphuric acid for opening the canals of teeth where the roots are curved or the canals obscure, or obstructed by osseous growths; it also acts well

in the case of putrescent pulps, as it destroys animal tissue by dehydration on account of its strong affinity for water.

DENTAL FORMULÆ.

For Mercurial and Ulcerative Stomatitis.

THOMAS.

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

For Aphthæ and other Ulcers of Mucous Membrane and Gums.

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

For Alveolar Pyorrhœa.

DR. A. W. HARLAN.

℞ Acidi sulphurici . . . ♏xxx
Essence cinnamon . ℥ss
Aquæ . . . . . ℥ss. M.
SIGNA.—Inject with a syringe 1 or 2 minims in each pocket if they are deep and sinuous, or carious; repeat every fourth day.

For Diarrhœa During Dentition.

If stools are serous and alkaline.

DR JAMES W. WHITE.

℞ Acidi sulph. aromat. gtt.viij
Spt. vini gallici . . . f℥ij
Syr. acaciæ.
Aquæ menth. pip. āā f℥ss. M.
SIGNA.—A teaspoonful every 2 hours in a little water.

For Carious Bone, Riggs' Disease, etc.

℞ Acidi sulphurici aromat. . . . . f℥iii
Tinctura capsici . . . . . gtt.x
Aquæ . . . . . f℥ii. M.
SIGNA.—To be used as an injection or lotion.

ACIDUM SULPHUROSUM—SULPHUROUS ACID.

Formula.—H_2SO_3.

Derivation.—Sulphurous Acid is made by dissolving sulphurous anhydride (SO_2) in water. The anhyride is made by burning sulphur. It is a colorless liquid, having the suffocating odor of burning sulphur, and a sour, astringent taste. Sulphurous acid contains 6.4 per cent. of sulphur dioxide gas and is a bleaching agent on account of its affinity for oxygen.

Medical Properties and Action.—It is a deodorizer and disinfectant, and destructive to micro-organisms, such as bacteria, fungi, etc.

Owing to its affinity for oxygen it acts upon organic matter with great energy.

Therapeutic Uses.—The diluted acid is locally applied to ulcers of the tonsils in diphtheria, syphilitic and tuberculous laryngitis, chilblains, parasitic skin diseases, ill-conditioned sloughing or gangrenous wounds; also used in pyrosis, indigestion, etc.

Also, in the form of inhalations of the sulphurous-acid gas, in cases of chronic bronchitis, etc. In the form of spray, it is used as a local application in diseases of air passages.

Dose.—Of sulphurous acid, ♏v to ʒj, properly diluted.

Dental Uses.—Dilute sulphurous acid is efficacious in mercurial stomatitis, aphthæ, and mucous patches, gangrene of the mouth, cancrum oris, ulcers of mucous membrane, and sloughing wounds. It is an efficient and convenient disinfectant.

For bleaching discolored teeth Dr. Kirk recommends a powder composed of 100 parts of sodium sulphite and 70 parts of boric acid which is packed into the cavity of the discolored tooth and afterwards moistened with water, then quickly and securely sealed.

For Chilblains.

BARTHOLOW.

℞ Acidi sulphurosi . . ʒiij
Glycerini . . . . . ʒj
Aquæ . . . . . ʒiss. M.

SIGNA.—Apply as a lotion.

For Destroying Parasites in Skin Diseases.

STARTIN.

℞ Acidi sulphurosi, dil. ʒss
Sodii hyposulphitis . ʒiij
Aquæ, q.s. ad. . . . ʒxvj. M.

SIGNA.—Apply as a lotion.

For Aphthæ.

DR. POTTER.

℞ Acidi sulphurosi . . . . . ʒij
Aquæ, q. s. ad. . . . . ʒij. M.

SIGNA.—Mouth wash, or may be used as a spray.

ACIDUM TANNICUM—TANNIC ACID—DIGALLIC ANHYDRIDE.

TANNIN.

Formula.—$C_{27}H_{22}O_{17}$.

Derivation.—Tannic Acid is obtained by exposing powdered galls to a damp atmosphere for several days, when sufficient ether is added to form a soft paste, which is allowed to stand for twenty-four hours. It is then subjected to pressure as quickly

as possible, and the mass again treated with ether, to which 1/16 of its bulk of water has been added; this is allowed to stand as before, and is again subjected to pressure. The expressed liquids are now combined and allowed to evaporate spontaneously; then, by the aid of a little heat, brought to a syrupy consistence, when it is dried on plates in a hot air chamber, at a temperature not exceeding 212° F. Pure tannic acid is solid, uncrystallizable, either white or slightly yellowish, inodorous, astringent to the taste, but without bitterness, and with an acid reaction. It is obtained in the form of vesicular masses, or thin, glistening scales, or in the shape of fine threads of a pseudo-crystalline appearance. Tannic acid exists also in rhatany, catechu, and other vegetable astringents, as it is their chief principle. It is soluble in 1 part of water or alcohol, and in 3 parts of glycerine.

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

It constringes the tissues, temporarily decreasing their vascularity, and causes contraction of their blood vessels. It arrests secretion and condenses relaxed and feeble tissues. When mixed with blood, it forms a clot rapidly on account of coagulation of the albumen.

Tannic acid is converted into gallic acid in the blood, by absorbing oxygen from the red corpuscles; this absorption does not occur in the stomach.

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

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

Listerine is one of the best solvents for tannic acid. One ounce of listerine will dissolve half an ounce of tannic acid.

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

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

Dental Uses.—In dental practice tannic acid in solutions of five grains to the ounce of water is a valuable agent for local use in the treatment of such diseases as mercurial stomatitis, ulceration of the gums, and mucous membrane of the mouth, hypertrophy of the gums, hemorrhage following the extraction of teeth and wounds of mucous membrane, fungous growth of pulp, sensitive dentine, sponginess of the gums, for the temporary relief of odontalgia, disease of the antrum. In mercurial salivation tannic acid, in the form of powder, moistened with water, will render the spongy gums firmer and more comfortable, causing contraction of the vessels and checking a tendency to absorption and the consequent loosening of the teeth. A strong solution of tannin in alcohol is beneficial in obtunding the sensitiveness fo dentine, or the tannin may be in the form of a powder, combined with morphine and creasote. Tannic acid, in the form of a paste or ointment, made by rubbing two scruples of tannin with twenty drops of glycerine, and then with an ounce of lard, makes a good astringent application. A gargle composed of tannic acid and glycerine is a useful application for abrasions caused by artificial teeth and other irritants. For the irritation caused by artificial dentures, regulating plates, etc., tannic acid dissolved in alkathymol, 5 to 8 grains to the ounce, is recommended. In preparing a proper solution of tannin, the 1 grain tablet triturate, or the 5 grain tablet will be found convenient. Adrenalin has in a great measure superseded tannic acid as a hemostatic agent. A preparation known as *Elixir of Vitriol and Tannin*, saturated solution, is a powerful astringent and hemostatic when applied to bleeding surfaces fungous growths, etc.

An Englich preparation known as *Styptic Colloid* is a saturated

solution of tannin and gun cotton, and is highly recommended for its styptic and deodorizing properties, as it solidifies blood and albumen by mere contact, and can be applied directly by means of a camel's-hair brush, or, mixed with an equal quantity of ether, in the form of spray. No irritation follows its use, and for hemorrhage from the extraction of teeth, or, in the treatment of necrosed or carious maxillary bones, it is very efficient. Cold or warm water will not dissolve it; but an ether and alcohol solution may be used to remove the dressing.

Tannic acid, as an internal remedy, has also been successfully administered for checking hemorrhage after tooth-extraction. Dr. W. L. Roberts says: tannic acid, administered internally, in proper doses, will stop, I believe, any case of such hemorrhage in from thirty minutes to one and one-half hour's time. He recommends three grains of tannic acid in one-third glass of water, giving as a dose two teaspoonfuls of the solution every five minutes until three doses are taken; then two teaspoonfuls every fifteen minutes if required. Dr. Roberts further says that such treatment has never failed him.

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

Glycerite of tannic acid—*Glyceritum Acidi Tannici*, for external use, is made of tannin, ℥ij; glycerine, ℥viij. Useful for inflamed and relaxed conditions of the uvula and fauces, applied by means of a camel's-hair brush.

Ointment of tannic acid—*Unguentum Acidi Tannici*, is made of tannin, ℥j; lard, ℥j. Useful for a local application to ulcers.

DENTAL FORMULÆ.

For an Astringent Dentifrice.

℞ Acidi tannici . . . . gr.xxx
Cretæ preparatæ . . ℥ij
Pulveris ossis sepiæ . ℥ij
Olei caryophylli . . gtt. iij. M.

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

℞ Acidi tannici . . . . ℥ij
Tincturæ arnicæ . . ℥ij
Tincturæ myrrhæ . . ℥. M.
Signa.—To be used as a lotion.

For Inflamed and Spongy Gums.

℞ Acidi tannici . . . . ℥j to ℥ij
Spiriti rectificati . . ℥j
Aquæ destillatæ . . . ℥x. M.
SIGNA.—To be used as a gargle.

For Inflamed and Ulcerated Mucous Membrane.

℞ Acidi tannici . . . . ℥ss
Spiriti vini rectificati ℥ss
Aquæ camphoræ . . f℥v. M.
SIGNA.—To be used as a gargle.

For Inflamed and Ulcerated Gums.

℞ Acidi tannici . . . . ℥iv
Glycerini . . . . . ℥ij. M.
SIGNA.—To be used as a gargle or mouth wash.

For same as above.

℞ Acidi tannici . . . ℥ij
Tinct. iodinii . . ℈iv
Potassii iodidi . . gr.xx
Tinct. myrrhæ . . ℈iv
Aquæ rosæ . . . . f℥viij. M.
SIGNA.—A dessert-spoonful in a wine-glass of water as a mouth wash or gargle.

For Inflamed Mucous Membrane of Mouth.

℞ Acidi tannici . . . . ℈ij
Pulveris aluminis . . gr.xxx
Aquæ destillatæ . . . ℥v. M.
SIGNA.—To be used as a gargle.

For Sensitiveness following the Removal of Salivary Calculus.

COLEMAN.

℞ Acidi tannici . . . . ℥ss
Eau de Cologne . . . f℥iv. M.
SIGNA.—Add 10 or 12 gtts. of above solution to a teaspoonful of tepid water, and use as a gargle 3 or 4 times a day.

For Loose Teeth and Spongy Gums.

℞ Acidi tannici . . . . ℥jss
Potassii iodidi . . . gr.xii
Tinct. iodi . . . . . ℥j
Tinct. myrrhæ . . . ℥j
Aquæ rosæ . . . . ℥vj. M.
Dissolve the tannic acid and iodide of potassium in the rose water and add the tinctures and strain.
SIGNA.—A teaspoonful in a wine-glass of warm water, used every morning as a mouth wash.

For an Astringent Mouth Wash in Inflamed and Ulcerated Conditions of Gum and Mucous Membrane.

℞ Acidi tannici . . . . gr.x to xv
Tincturæ pyrethri . . ℥iij
Aquæ rosæ . . . . ℥vj. M.
SIGNA.—To be used as a gargle.

For Ulcerations and Abrasions.

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

For Inflamed Mucous Membrane of Mouth.

℞ Acidi tannici . . . . ℥ss
Sodii boratis . . . . ℥iij
Glycerini . . . . . ℥ij
Aquæ destillatæ . . . ℥iv.
SIGNA.—Use as a gargle.

For Inflamed Mucous Membrane of Mouth and Fauces.

℞ Acidi tannici . . . . ℥j
Tinctura myrrhæ . . ℥iij
Pulv. aceciæ . . . . ℥ij
Glycerini . . . . . ℥ij
Aq. destil. q.s. ad . . ℥vj. M.
SIGNA.—Use as a gargle.

For Odontalgia.

DRUITT.

℞ Acidi tannici . . . . gr.xx
Gun mastich . . . . gr.x
Spt. æther sulph. . . f℥ss. M.

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

For Alveolar Hemorrhage.

℞ Acidi tannici . . . . gr.xl
Liq. plumb. subacet. dilut, ... f℥iss
Vin. opii . . . . . f℥ss. M.

SIGNA.—Apply on cotton or lint, or as an injection.

For Chronic Ulcers and Abscesses.

BEREL.

℞ Acidi tannici . . . . gr.xxxij
Aquæ destillatæ . . f℥viij. M.

SIGNA.—To be used as a lotion.

Astringent and Antiseptic Gargle.

℞ Tannin . . . . . 5 grammes.
Tincture iodine . .
Tinct. myrrh. āā 2 1/2 grammes.
Iodide of potassium . 1 gramme
Rose water . . . 180 grammes. M.

SIGNA.—A teaspoonful in a glass of water.

ACIDUM TARTARICUM—TARTARIC ACID.

Formula.—$H_2C_4H_4O_6$.

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

It is in the form of white or colorless crystals, irregular, six-sided prisms, and is soluble in water and alcohol, and wholly dissipated by heat. It is soluble in 0.8 of water and 2.5 of alcohol and is a substitute for citric acid or lemon juice.

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

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

Therapeutic Uses.—Internally it is employed as a refrigerant in inflammatory and febrile diseases, irritability of the stomach, nausea and vomiting, dyspepsia, and diseases attended with copious secretion of mucus, dysentery, etc., etc.

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

Dental Uses.—In combination with an equal quantity of chloride of lime, it has been employed for bleaching discolored teeth.

ACONITUM—ACONITE.

WOLFSBANE, MONKSHOOD.

Source.—Aconite is obtained from the dried, tuberous root and leaves of *Aconitum Napellus*, a perennial plant abounding in the mountains of Europe and Asia. The root is the most powerful. The alkaloid *Aconitia* or *Aconitine*, a sedative poison, is obtained from the root, and is externally employed for neuralgic affections, producing a sensation of heat and pricking, succeeded by a feeling of numbness and constriction in the part on which it is rubbed; and very satisfactory results have been obtained from the internal administration of Duquesnel's Aconitia, in neuralgia of the fifth pair of nerves. Another principle of aconite, suggested by Duquesnel, is known as *Napelline*, which is less powerful than aconitia, but possesses important hypnotic properties, and is substituted for opium and chloral, especially in cases of wakefulness and mental excitement during neuralgic attacks.

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

Therapeutic Uses.—Aconite, in the form of an extract prepared from the leaves, and a tincture prepared from the root, is administered in all inflammatory and febrile affections, acute rheumatism, neuralgia, especially in chronic cases of neuralgia, where all the signs of active disease are absent, or have been relieved by other remedies; tetanus, sciatica, diseases of the heart, erysipelas, amenorrhœa, tonsillitis, acute congestion of liver, peritonitis, eruptive fevers, etc., etc. It is contraindicated in inflammatory conditions of the gastro-intestinal mucous membrane.

It is locally applied to painful sprains and bruises, and chronic arthritic swellings.

Dose.—Of the tincture of aconite—*tinctura aconiti*—gtt. j to gtt. v; of the extract of aconite—*extractum aconiti*—gr. j to gr. ij. Dose of aconitia, gr. 1/240. The tincture is prepared from the standard fluid extract as follows: Fluid extract aconite root, f℥vij; alcohol, f℥ix; water, f℥iv.

Dental Uses.—Aconite, in the form of the tincture, is a valuable agent in dental practice. When locally applied, it checks inflammation in its early stages, by paralyzing the nerves of the part and lessening the excitement to the local afflux of blood, favoring resolution and limiting the extent of an abscess where pus is already formed. It is also employed to control the heart's action in acute pericementitis. Combined with an equal part of the tincture of iodine, it is a valuable application in the incipient stages of periodontitis, as it relieves the inflammation by retarding the circulation and stimulating lymphatic action, and acting as a counter-irritant. For such purposes the gum or root of the affected tooth should be painted with this combination until it assumes a dark brown color, taking the precaution to first remove all moisture from the surface to which it is to be applied, and, after its application, protecting the adjoining parts, such as the lips or cheeks, until the remedy is absorbed. What is called *dental tincture of aconite* is made by evaporating the officinal tincture to one-fourth its bulk. A drop or two of the tincture, introduced into the cavity of an aching tooth, will relieve odontalgia; and the same quantity will subdue the pain which follows the extraction of a tooth, especially when the cause has been the inflammation of the peridental membrane. Tincture of aconite is also serviceable in the conservative treatment of irritated or inflamed pulps of teeth. Combined with an equal quantity of chloroform, it is applied as a local anæsthetic for the extraction of teeth. For the same purpose it is combined with chloral, pyrethrum, morphia, etc. (See Dental Formulæ.) It is also a useful dressing for the pulp canals of teeth, preventing the formation of inflammatory products. The alkaloid, *aconitia*, is a useful remedy in neuralgia of the fifth pair of nerves. (See Dental Formulæ.) Care is necessary in the application of the tincture of aconite to large surfaces, or where the skin is abraded, as danger-

ous constitutional effects may result. Fifteen drops of the tincture, taken internally, have caused death. The symptoms of poisoning by aconite are as follows: Overpowering sense of fatigue in the lower extremities, great muscular weakness, dimness of vision, with dilated pupils; great dyspnea, the respiration being short and labored; the pulse at first slow and small, and afterward imperceptible; surface of body, tongue and breath cold; a profuse perspiration; muscles of respiration paralyzed; ceasing of the heart's action. The antidotes are emetics and stimulants—heat, brandy and ammonia; patient kept flat on back.

DENTAL FORMULÆ.

For Neuralgia.

℞ Pulveris radicis aconiti . . . . . ℥x
Camphoræ . . . . . ℥ss
Spiriti rectificati . . q.s.

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

SIGNA.—Apply with a camel's-hair brush.

For Odontalgia.

℞ Tincturæ aconiti,
Chloroformi, ... ää f℥iij
Tinct. capsici . . . f℥j
Tinct. pyrethri.,
Ol. caryophylli . . . ää f℥ss
Gum camph. . . . . ℥ss. M.

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

A Local Anæsthetic for the Extraction of Teeth.

℞ Tincturæ aconiti . . ℥iss
Pyrethri . . . . . ℥iij
Veratrinæ . . . . . gr.x
Morphinæ sulphas . gr.iv
Spiriti rectificati . . ℥iv
Chloral hydratis . . gr. iv. M.

Let it stand 4 days and then filter.

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

For a Local Anæsthetic for Extraction of Teeth.

℞ Tinctura aconiti . . f℥j
Menthol . . . . . gr.x
Chloroformi . . . . f℥j. M.

SIGNA.—Apply freely to gum about tooth for several minutes.

For Neuralgia and Rheumatic Pains Bruises, etc.

℞ Tincturæ aconiti,
Chloroformi venalis,
Spiriti ammoniæ . . ää f℥ij
Oleo ricini . . . . . ℥i
Linimenti saponis . . f℥j M.

SIGNA.—To be rubbed on the affected part.

For Neuralgia of Fifth Pair of Nerves.

(For Internal Use.)

℞ Aconitum gr.1/10
Glycerini,
Alcohol . . . . . ää ℥j
Aquæ menthæ pip . . ℥ij. M.

DOSE.—A teaspoonful.

For Neuralgia.

℞ Linimenti aconiti,
Lin. belladonnæ . . āā ℥vij
Chloroformi . . . . ℥ij. M.

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

For Trigeminal Neuralgia.

℞ Aconitine Crystalisee (Duquesnel's) . . . gr. 1/10
Glycerini,
Alcohol . . . . . āā ℥j
Aquæ menthæ pip. . ℥ij. M.

Dose.—A teaspoonful, slowly and cautiously increased by adding to the solution 1/8 of a grain of the aconite instead of 1/10.

For Periodontitis.

℞ Tincturæ iodi,
Tincturæ aconiti . . āā ℥ss. M.

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

To Abort an Abscess.

Dr. Geo. Watt.

℞ Ext. aconiti, fl.
Ext. belladonnæ, fl.
Ext. opii., fl āā equal parts. M.

Signa.—Apply with brush as needed to ease pain, also give fluid extract of phytolaccæ internally.

For Pericementitis.

Dr. J. P. Buckley.

℞ Tincturæ aconiti . . f℥ij
Tincturæ iodi
Chloroformi . . . . āā f℥j. M.

Sig.—Dry gum and apply over the affected tooth for several minutes.

ÆTHER—ETHER—ETHYLIC ETHER.

ÆTHER SULPHURICUS—SULPHURIC ETHER.

Formula.—$C_4H_{10}O$, or $(C_2H_5)_2O$. Sp. gr.—Of pure ether, 0.713; of stronger ether, 0.728; of ordinary officinal ether, 0.750.

Derivation.—Sulphuric Ether is obtained by the distillation of alcohol and sulphuric acid, and is rectified by re-distillation with solution of potassa. The form of sulphuric ether employed for inhalation is still further purified by agitation with water, and it is freed from this and from an excess of alcohol and deleterious acid substances by the action of chloride of lime and freshly calcined lime, when it is known as stronger ether—*Æther Fortior.* Pure ether has a Sp. gr., 0.713, and is practically free from alcohol and water. Sulphuric ether is a colorless, limpid, volatile and inflammable fluid, with a sweet, penetrating odor and a hot, pungent taste; on account of its great volatility, it should be kept securely in ground-glass-stoppered bottles. It should never be held near a fire or light. It usually reddens

litmus paper slightly; when it does so strongly, the ether is impure. The impurities, besides acids and fixed substances, are heavy oil of wine, an excess of alcohol and water. Acids being detected by litmus paper, may be removed by agitation with potassa; fixed substances may be removed by evaporating the ether. Some alcohol is always found in ether, and it is only when it is present in too great a quantity that the density of the ether is rendered too high. The quantity of alcohol any preparation of ether may contain, can be determined by agitating it in a minim measure with half its volume of a concentrated solution of chloride of calcium. This will remove the alcohol, and the reduction of the volume of ether when it rises to the surface will indicate the amount of alcohol which has been present. Heavy oil of wine can be detected by the ether becoming milky when mixed with water. Ether boils at 95° F., and a cold of 166° below zero will not freeze it. When kept too long it undergoes decomposition, and is converted in part into acetic acid.

It evaporates so readily and completely in the air as to cause a great degree of cold; hence it has been employed in the form of spray, as a local anæsthetic. It combines with alcohol and chloroform in all proportions, and dissolves in ten times its volume of water, and is miscible with alcohol, chloroform and oils.

Medical Properties and Physiological Action.—Ether is a diffusible stimulant, antispasmodic, anodyne and anæsthetic. Its action on the animal organism is rapid and powerful, but temporary, and, except for its rapidity, is similar to that of alcohol. When applied to the skin it produces intense cold by its evaporation, and when applied in the form of spray it benumbs or locally freezes a part.

Both the liquid and vapor act as an irritant to mucous membranes, and its vapor when first inhaled causes great irritation of the fauces and respiratory tract, often causing a temporary arrest of respiration, the face becoming suffused and red and the conjunctiva injected, such conditions causing restlessness and struggling; but a quiet stage soon follows the primary stage. During this second stage, the breathing is usually full and deep, and the pulse rapid and strong, the ocular reflexes at the beginning being intact. The second stage may also be one of struggling, during

which the patient may become uncontrollable except by great force, but if the inhalation be pushed a third stage of complete anæsthesia is soon attained, when any surgical operation may be performed. The inhalation should not be carried to complete flaccidity of muscular contraction as the respiration may be obstructed.

Sulphuric ether first acts upon the brain, then upon the sensory and motor tracts of the spinal cord, then on the sensory and motor tracts of the medulla oblongata, and, if given to excess, it causes death from respiratory failure. It produces no effect upon the nerve trunks unless it is directly applied to them. It does not act by any destructive influence on the blood, but simply suspends for a time the vital functions of the part which it affects. It is one of the most diffusible and rapid cardiac stimulants, increasing the pulse rate and force, and stimulating the heart and the arterial pressure by accelerating the activity of vaso-motor centres. In excessive doses it is a depressant of the heart, and decreases the hæmoglobin and the number of the red corpuscles, especially in the anæmic. It acts as a powerful stimulant on the respiratory centre, but in excessive doses it paralyzes this portion of the system. It lowers the bodily temperature by depressing the nervous system, and by its evaporation. It is eliminated by the lungs and kidneys. It is administered internally in the form of ether or of Hoffman's Anodyne, compound spirit of ether—*Spiritus Etheris Compositus* (composed of ether, Oss, ethereal oil, f℥vj, and alcohol, Oj), also, in the form of spirit of nitrous ether, *Spiritus Etheris Nitrosi*, and known as sweet spirit of nitre (a solution of nitrous ether in alcohol). Ether is internally given in ice-cold water or capsule.

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

Therapeutic Uses.—Ether is employed internally as an antispasmodic and anodyne, for angina pectoris, hysteria, asthma, flatulence, cramp of stomach and bowels, syncope, epilepsy,

hiccough, nervous or hysterical headache. Hoffmann's Anodyne possesses the antispasmodic and stimulating effects of ether, and the andoyne effects of ethereal oil, or oil of wine, and is also carminative. Ether vapor should not be administered in bronchitis or acute kidney disease on account of its irritant effects, nor in aneurism, peritonitis or gastritis.

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

Dose.—Of ether, f℥ss to f℥j; of Hoffmann's Anodyne, f℥ss to f℥if, in sweetened water; of spirit of nitrous ether, f℥ss to f℥ss.

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

Sulphuric Ether as an Anæsthetic Agent.—Sulphuric ether is generally considered to be a safer anæsthetic agent than chloroform, as but comparatively few deaths have resulted from its inhalation; but it is not absolutely free from all dangerous effects, and when death has ensued from its inhalation either serious kidney or heart affections have been present. The discovery of its anæsthetic properties was first made in 1844, by Dr. Horace Wells, a practicing dentist, of Hartford, Conn.; and Dr. Morton, of Boston, also a dentist, first demonstrated the application of its anæsthetic properties in dentistry and surgery, in 1846.

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

The primary effect is a general exhilaration; and, in the case of ether especially, it is often one of excitement, which, in the majority of cases, may continue for a short time only, while in other

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

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

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

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

Mr. Woodhouse Braine divides anæsthetics into two classes: (1) Those which produce death through the lungs as well as through the heart; this class includes chloroform, bichloride of methylene, dichloride of ethidene, and many others of the chlorine series; (2) those which produce death through the lungs alone, the heart's action continuing for some time after respiration has quite ceased: this class includes ether and nitrous oxide; and he says, that in choosing an anæsthetic three factors are to be considered: (1) The nature of the operation; (2) the amount of insensibility necessary; (3) the length of time during which insensibility has to be kept up; and he sums up as follows: (1) It is well to avoid all anæsthetics which tend to depress the heart's action; (2) for short operations nitrous oxide is the best agent; (3) for long operation, except where it is desirable to avoid hemorrhage, or where the cautery is used, ether answers perfectly; (4) the best time for operating is the early morning; (5) nitrite of amyl is the best cardiac stimulant.

The Administration of Anæsthetics.—To administer ether or chloroform, take a folded piece of lint, of three or four thicknesses, and of a size that can be held conveniently in the hollow of the fingers and palm of the hand; and on it pour the anæsthetic agent—half an ounce of ether or a drachm of chloroform. Some prefer a large napkin or towel, folded in the form of a cone, with an opening of an inch or an inch and a half at the apex, for the admission of the air. The advantage, however, of the lint over the folded napkin is, that by holding the lint in the hand but little evaporation occurs. To give sufficient air to the patient when beginning the administration of ether, Dr. D. B. Keefe recommends the use of a large towel, folding it first five times lengthwise, and placing a piece of paper the full length between the outside folds, then roll it up into a cylinder, the size to be governed by the face of the patient: it should be large enough to cover the face, but not too large. This makes a cylinder open at both ends, full

size. Then saturate the lower part of the cylinder, that comes against the face, with the ether and apply it to the face, and as the other end is open the patient receives considerable air as well as the ether vapor. Before commencing the inhalation, the condition of the pulse should be ascertained by placing the middle finger of the left hand on the left temporal artery, and at the same time endeavor to reassure the patient and allay fear by cheerful words. The clothes should be loose, and artificial teeth, if any are worn, as well as pins or tobacco, if the habit of keeping them in the mouth is indulged in, should be removed before the administration of the anæsthetic is commenced, to prevent them from slipping into the larynx and causing death. The patient should be directed not to partake of any food for twelve hours preceding the administration of ether in order to avoid vomiting, except a little milk or tea one or two hours before its administration —a piece of wet muslin may be placed over the eyes—to prevent the vapor or liquid from causing irritation. The inhalation should be commenced by holding the moistened lint or towel three or four inches from the patient's face, directing him to breathe quite naturally, always remembering that a strong atmosphere in the early stages of the inhalation is dangerous, and carefully watching for coughing or acts of swallowing, when, if any such occur, the lint or towel should be moved further away, and approached again more gradually. If the patient shows no signs of the anæsthetic vapor being too strong, the lint or towel may be gradually brought to within an inch and a half of the patient's mouth and nostrils; and to still more concentrate the the atmosphere, if lint is used, the hand holding it may be covered with one fold of an ordinary large napkin, which may hang loose over the mouth and chin, but should be so arranged above that the patient's eyes and forehead may remain uncovered and visible. The inhalation should be commenced cautiously, by instructing the patient to breathe quite naturally, and to obey any direction to raise the hand or open the eyes.

When the inhalation has fairly commenced, it should be continued until there is no winking when the margins of the eyelids are touched, or the hand cannot be raised, and the limbs are perfectly relaxed, when the patient is ready for the operation; what is termed the "surgical period" having arrived. An inhalation

with chloroform generally takes about four minutes; often more seldom less. With ether, the time required is longer and the quantity of the agent greater.

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

The operator should devote his undivided attention to the patient, during the inhalation of anæsthetics. One finger should be kept on the pulse, and the respiration should be carefully noted; for the latter is of more importance than the former, although the pulse is by no mens to be neglected. When the patient becomes excited, he should be watched very closely, and if the respiration becomes proportionately quickened, so must the vapor of the anæsthetic be proportionately weakened, by withdrawing the lint or towel slightly from the face.

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

The late Prof. J. J. Chisholm, of the University of Maryland, gave the following five simple rules for the administration of chloroform, and which will apply to ether also:—

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

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

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

"4. Give chloroform on a thin towel, folded in conical form, with open apex, so that the vapor, before inhalation, will be freely

diluted with atmospheric air. In holding this cone over the face of the patient, at some little distance from the nose, place the fingers under the borders of the cone, for the double purpose of allowing the air to enter freely, and also to prevent the chloroform liquid on the towel from coming in contact with the skin of the patient's face, and thereby avoid its blistering effects.

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

"While operating, I have constantly in view both the color of the face and the respiration of the patient, which I consider even more important for the surgeon to observe than to feel the pulse." (See "Chloroform" for further directions and precautions to be observed during the administration of this agent.)

Dr. H. A. Hare states that if during anæsthesia, respiration stops, he has found that in a large number of instances, both in man and in the lower animals, the free use of ether poured upon the belly causes so great a shock, by the cold produced by its evaporation, as to cause a very deep inspiration, which is often followed by the normal respiratory movements.

Dr. H. I. Neilson gives the following conclusions concerning the pupil as a guide in the administration of chloroform:

1. The first effect of chloroform narcosis on the pupils consists in a dilatation which varies in intensity and duration in different individuals. As the anæsthesia becomes more profound the pupils begin to contract and finally become very small and immovable. If now the chloroform is pushed still further, a sudden dilatation occurs, which is the result of asphyxia, from which the patient seldom recovers.

2. As long as the pupil is observed to dilate in response to sensory stimuli, such as pinching the skin, the anæsthesia is not yet sufficient to allow the commencement of the operation.

3. As soon as the pupil becomes strongly contracted and immovable, the administration of the anæsthetic must be suspended, until a commencing dilatation is observed, and the

patient must be held at just this point as long as the operation continues.

4. Vomiting causes a dilatation similar to that occurring as the patient emerges from the narcotic condition, but it is usually more sudden in the former case. The contraction of the pupils does not appear to begin until the blood-pressure is somewhat reduced, and the dilatation proceeds *pari passu* with the increase in the blood-pressure. He therefore regards the appearance of the pupil as a very reliable guide for the administration of chloroform, as he is enabled to judge accurately concerning the condition of the patient.

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

The vapor from a mixture composed of equal parts of chloroform and alcohol has been combined with the nitrous oxide gas. This vapor from two or three drops of the chloroform and alcohol mixture is used with each gallon of gas, the anæsthetic effect of which, it is claimed, is more lasting, and at the same time less dangerous, than from either of the two agents alone. An apparatus for combining these two agents is in use, which is attached to the gas cylinder, in place of the ordinary connection. (See the combinations of oxygen and air with nitrous oxide, under Nitrous Oxide.)

The Dangers of Anæsthesia.—The conditions rendering general anæsthetics dangerous are fatty degeneration of the heart (a prominent contraindication); previous alcoholic habits; brain tumors and degenerations; respiratory obstruction from swollen epiglottis, enlarged tonsils, œdema glottidis, laryngeal paralysis, thoracic tumors or aneurism; emphysema and obstructed pulse

circulation from engorgement of right heart and deficient heart power; valvular lesions; incomplete anæsthesia during painful surgical operations, causing death from shock, as the result of peripheral irritation. Muscular debility and weakness from exhaustion, if otherwise uncomplicated, are considered to be rather aids to anæsthesia than contraindications.

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

Treatment of Dangerous Symptoms of Anæsthesia.—The suspension of the heart's action necessitates the immediate withdrawal of the vapor and the immediate *inversion* of the patient, according to Nélaton's method. The failure of respiration necessitates the forcing up of the chin, or the forcible drawing out of the tongue to lift the epiglottis; the practice of artificial respiration by the Sylvester method, and by faradization of the respiratory muscles; the inhalation of gtt. iij to gtt. iv of nitrite of amyl; ammonia to the nostrils; galvanism (the positive pole being placed to the nostril, and the negative pole over the diaphragm, to excite a reflex action between the fifth pair and the pneumo-gastric, or the poles may be placed directly over both phrenic nerves, on a line with the fourth cervical vertebra, in order to stimulate respirations; or one pole may be placed over the upper dorsal spinous process, and the other pole over the

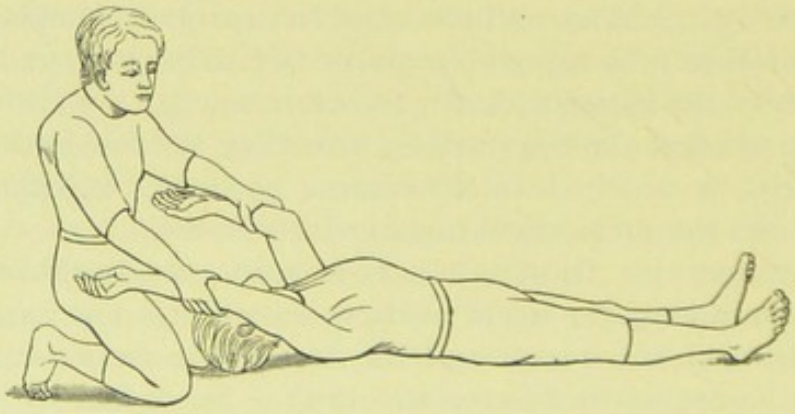
apex of the heart, to induce cardiac contraction). Artificial warmth should be applied, but no cold applications.

The inversion of the body according to Nélaton's method, and artificial respiration, according to Sylvester's method or Marshall Hall's ready method, or Howard's method, are safe and are the most promising expedients. A simple method of producing artificial respiration is as follows:—

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

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

"*To Adjust the Patient's Position.*—Place the patient on his back, on a flat surface; raise and support the head and shoulders on a small, firm cushion, or folded article of dress, placed under



the shoulder-blades; remove all tight clothing about the neck and chest.

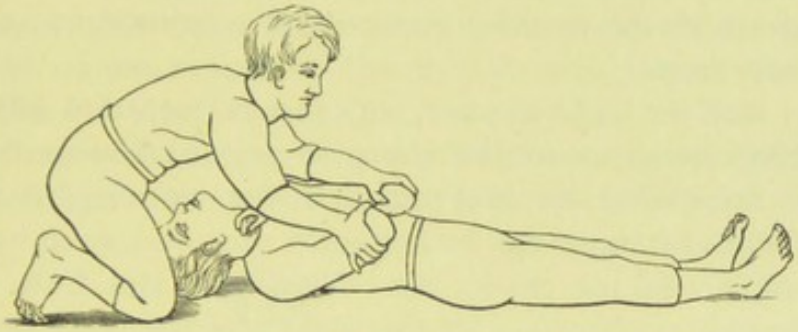
"*To Maintain a Free Entrance of Air into the Windpipe.*—Cleanse the mouth and nostrils; open the mouth; draw forward the patient's tongue and keep it forward; an elastic band over and under the chin will answer the purpose.

"*To Imitate the Movements of Breathing:*—

"*First, Induce Inspiration.*—Place yourself at the head of the patient; grasp his arms; raise them upward by the sides of his head; stretch them steadily but gently, upward and backward,

for two seconds. By this means fresh air is drawn into the lungs, by raising the ribs.

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



"*Thirdly, Continue these Movements.*—Repeat these movements alternately, deliberately and perseveringly, fifteen times in a minute, until a spontaneous effort to respire be perceived. By this means an exchange of air is produced in the lungs, similar to that effected by natural respiration."

MARSHALL HALL'S READY METHOD IN ASPHYXIA.

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

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

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

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

"5th. If not successful, lose no time; but, *to imitate respiration,* place the patient on his face, and turn the body gently, but completely, *on the side and a little beyond;* then again on the face, and so on, alternately. Repeat these movements deliberately

and perseveringly, *fifteen times only* in a minute. (When the patient lies on the thorax, this cavity is *compressed* by the weight of the body, and *ex*piration takes place. When he is turned on the side, this pressure is removed, and *in*spiration occurs.)

"6th. When the prone position is resumed, make a uniform and efficient pressure *along the spine*, removing the pressure immediately before rotation on the side. (The pressure augments the *ex*piration; the rotation commences *in*spiration.) Continue these measures.

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

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

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

"AVOID the immediate removal of the patient, as it involves a *dangerous loss of time;* also the use of bellows, or any *forcing* instrument; also, the *warm bath* and *all rough treatment.*"

DR. HOWARD'S METHOD OF RESUSCITATION.

One of the most efficient, as well as the most recent method, is that of Dr. Howard for performing artificial respiration.

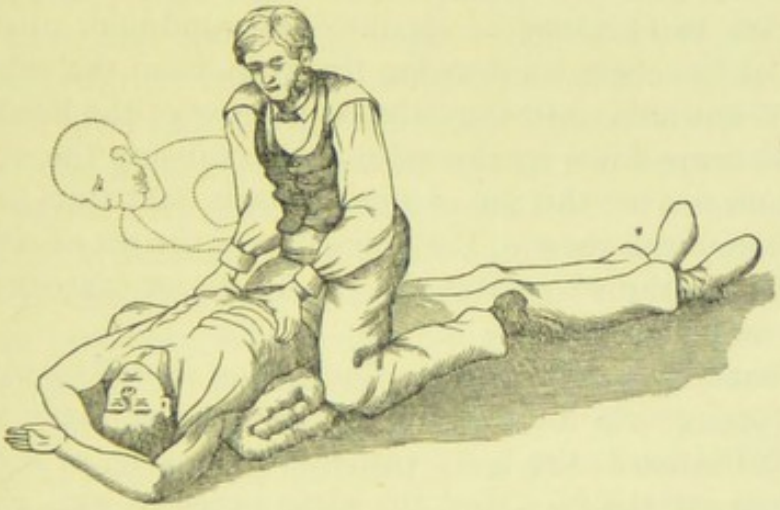
Position of Patient.—Face upward, a hard roll of clothing beneath the thorax, with shoulders slightly declining over it. (One twist of handkerchief around the crossed wrists will keep them there.) Rip or strip clothing from waist and neck.

Position of Operator.—Kneel astride the patient's hips; place your hands upon his chest, so that the ball of each thumb and little finger rests upon the inner margin of the free border of the costal cartilages, the tip of each thumb near or upon the xiphoid cartilage, the fingers fitting in the corresponding intercostal spaces. Fix your elbows firmly, making them even with your sides and hips; then—

Action of Operator.—Pressing upward and inward toward the diaphragm, use your knees as a pivot, and throw your weight

slowly forward two or three seconds until your face almost touches that of the patient, ending with a sharp push, which helps to jerk you back to your erect kneeling position. Rest three seconds, then repeat this bellows-blowing movement as before, continuing it at the rate of seven to ten times a minute, taking the utmost care on the occurrence of a natural gasp, gently to aid and to deepen it into a longer breath, until respiration becomes natural. When practicable, have the tongue held firmly out of one corner of the mouth with thumb and finger armed with a dry cotton rag.

Very frequently during the early stages of the administration of an anæsthetic the patient may "forget to breathe," even be-



fore the ability to perceive peripheral irritation is lost. Even later in the anæsthesia, when the breathing suddenly ceases, instead of using cold water externally and slapping the patient with wet towels, Dr. H. A. Hare recommends pouring a quantity of ether upon the belly, the shock caused by the cold produced by its evaporation bringing on a very deep inspiration, followed often by the normal respiratory movemennts.

*Asphyxia and Apnœa.**

From Drowning.—Remove the person from the water as rapidly and gently as possible, turn the face downwards for a moment, and depress the tongue, in order that water, mucus, etc.,

* From Potter's Materia Medica, Pharmacy and Therapeutics.

may be removed from immediately over the entrance of the windpipe. Give the patient plenty of fresh air, fully exposing neck and chest to the breeze unless inclement. Turn gently on the face, one forearm being under the forehead, and raise the body up that the water may have free discharge from the mouth. Place patient upon the side and apply stimulants (ammonia, etc.) *near* the nostrils; or rhe cold douche in ordet to excite respiration.

The above measures being ineffectual, convey the body to the nearest convenient spot, strip it carefully and dry it, and place it on a warm bed, with head and shoulders slightly raised, and at once employ one of the following methods.

SILVESTER'S METHOD.—Pull the tongue forward, to prevent obstruction to entrance of air into the windpipe; produce expansion of the chest by drawing the arms from the sides of the body and upwards until they almost meet over the head. Then bring the arms down to the sides again, causing the elbows almost to meet over the pit of the stomach, and thus producing contraction of the chest. This imitation of the act of respiration should be continued at the rate of fifteen or sixteen times a minute, as in health.

MARSHALL HALL'S METHOD.—The person should be placed flat on the face, gentle intermittent pressure being made with the hands on the back, the body turned on the side, or a little beyond, then on the face, and the same pressure, etc., continued as at first. The whole body must be worked simultaneously. The same number and frequency of these artificial processes of respiration should be employed as in the other method.

THE MICHIGAN METHOD.—Lay the body face down, the head upon the arm, and stand astride it; grasp it then about the shoulders and armpits, and raise the chest as high as you can without lifting the head quite off the arm, and hold it about three seconds; then replace the body upon the ground, and press the lower ribs downwards and upwards, with slowly increasing force, for ten seconds; then suddenly let go, to perform the lifting process again.

Whichever process be employed, the effort to restore the temperature of the body must be maintained, the body being well rubbed in an upward direction with the hands, with warm flannels,

etc.; bottles of hot water, hot bricks, etc., being applied to the stomach, the axillæ, the soles of the feet, etc., stimulants and beef-tea being judiciously administered when restoration is about taking place. The attempts at resuscitation must be persevered in for several hours, if necessary.

Laryngotomy or tracheotomy, with or without catheterization, or forced insufflations of air or oxygen, have proved successful, as also electro-puncture (Garratt).

In artificial inflation, always press the larynx and trachea against the vertebral column, so as to close the œsophagus and thus prevent the air entering,the stomach.

After Long Submersion is Recovery Possible?—According to Harley, dogs kept under water 1 1/2 minutes always died, if water had entered the lungs. If it had not, the trachea being plugged, they survived a submersion of 4 minutes. When persons rise after sinking they usually get some air, and less speedily come into a state from which recovery is impossible. The greatest period between the last inspiration and the stoppage of the heart is 4 minutes. Some think that no recovery has been made after complete cessation of the heart's action. We infer that after complete submersion for 5 minutes recovery is improbable, unless the person had been previously choked, or in a fainting state, so that no water entered the lungs. But in Anderson's case, the patient had been under water at least 15 minutes, and in Garratt's the time was variously estimated at from 15 to 60 minutes.

When is a Case Hopeless?—Harley says: "If the eyes are open, the pupils dilated, the conjunctiva insensible, the countenance placid, the skin cold, frothy mucus round the nostrils and mouth, no attempt at respiration, and the heart's action inaudible (when the ear is applied to the chest), the case is hopeless."

Signs of Death.—The following have been suggested as methods of deciding whether death has occurred:—

(*a.*) Tie a string firmly about the finger. If the end of the finger becomes swollen and red, life is not extinct.

(*b.*) Insert a bright steel needle into the flesh. If it tarnishes by oxidation in the course of half an hour, life may be considered not extinct.

(*c.*) Inject a few drops of Liquor Ammoniæ under the skin. During life a deep red or purple spot is formed.

(*d.*) Moisten the eye with Atropine. During life the pupil will dilate.

(*e.*) Look at a bright light or at the sun, through the fingers held closely side or side. During life the color is pink; after death a dead white.

(*f.*) After death a dark spot is said to form gradually on the outer side of the white of the eye, from drying of the sclerotic, so that the dark choroid shows through.

(*g.*) Putrefaction is an absolute sign of death. Better delay for it than run any risk of burying alive.

From Foreign Bodies in Air Passages.—If round and smooth, invert the patient and strike on the back: laryngotomy: tracheotomy.

Of the New-born.—Clean the mucus out of nostrils and throat; catheterize the trachea, and suck up the mucus. "Marshall Hall's method": by placing child on abdomen, then bringing into lateral posture, repeating slowly and deliberately. "Schultze's method": by placing the thumbs upon the anterior surface of thorax, the indices in the axillæ, and the other fingers along the back, the face of the child being from you; rotate the child, by swinging upwards, so that the inferior extremities turn over towards you. In a moment re-rotate to the original position. Do not support head or legs in the forward rotation; their bending upon or towards the abdomen gives a forced expiration.

Local Anæsthesia.—The fatality attending the use of general anæsthetics led to the introduction of what are termed "local anæsthetics," some of which depend upon the therapeutic property of cold, which is properly an anæsthetic only when it freezes the part to which it is applied. The use of cold for such a purpose must necessarily be limited to small parts of the body, and its utility depends upon the ease and rapidity with which a desired spot of living flesh can be frozen, in other words, temporarily deprived of its vitality, without inflicting mechanical injury on the delicate structure of the part.

According to Dr. Richardson, the proposer of the method, the principle consists in directing on the part of the body a volatile liquid, having a boiling point at or below blood heat, in a state

of fine subdivision or spray, such subdivision being produced by the action of air or gaseous substance on the volatile oil to de dispersed. When it falls on a part of the body, it comes with force into the most minute contact with the surface upon which it strikes.

As a result, there is rapid evaporation of the volatile fluid, and so great an evolution of heat force from the surface of the part to which the spray is applied, that the blood cannot supply the equivalent loss. The part consequently dies for the moment, and is insensible; but as the power of the body is unaffected, the blood, as soon as the external reducing agency is withdrawn, quickly makes its way again through the dead parts, and restoration rapidly occurs.

The fluids used are ether, of a specific gravity not exceeding 0.723, highly rectified, and as free as possible from either alcohol or water—what is known as "absolute ether"—and rhigolene, a product of petroleum, and the lightest liquid known, ethyl or methyl chloride, and pental.

When a current of the volatile liquid, either atomized ether or rhigolene, comes in contact with the skin by the use of the spray apparatus, an intense degree of cold is produced, which deprives the nerves of the part of their power to transmit impressions to the sensorium. For the extraction of teeth, destruction of the pulps of teeth, opening abscesses, and other minor surgical operations, and neuralgia of superficial nerves, success has attended the use of such local anæsthetics. The greatest objections to such a method of inducing local anæsthesia, are the great pain which attends the first application, and the unpleasant burning sensation of the part when it is recovering from the freezing process. (See Rhigolene.) (See Aconite, for obtunding mixtures.)

Liquefied chloride of methyl dissolved in ether and carefully applied by means of a hair pencil, is recommended for the painless extraction of teeth, the opening of alveolar abscesses, etc., etc. (See Cocaine, Tropacocaine, Beta-Eucaine, Vapocaine, and Chloretone, etc., as local anæsthetics.)

A plan of local anæsthesia, known as *Voltaic Narcotism*, has been suggested by Dr. Richardson, of London. It consists in passing a galvanic current through a narcotic solution held in

contact with the part to be operated upon. This plan appears to be successful only where the cavity of the tooth to be extracted is exposed.

Electro-magnetism has also been employed as a local anæsthetic, and it is a mooted question whether it relieves pain or complicates the sensations. It is well, however, to remember that some persons are so peculiarly constituted as to render them very susceptible to the influence of electricity. Dr. Scott describes his method of applying electricity for the extraction of teeth as follows: "Use a Kidder electro-magnetic machine, or any other giving very rapid vibrations of armature. Place the positive electrode on the gum of the tooth to be extracted, and the negative in the patient's hand, or at the back of the neck. Start with a light current and gradually increase the strength as much as can be borne without producing pain. The electrode applied to the tooth should embrace each side, the better to convey the current. For this purpose it should be bifurcated at the end of the handle, the arms of sufficient length for convenience in operating. At the end of these are small disks about the size of a dime. The handle and arms must be insulated to prevent the current passing off at any other point than the disks. Cover the disks with thin pads of fine sponge. A cylinder electrode, also covered with fine sponge or cloth, is the proper one for the hand. Moisten each with saline water. Another method is to attach one pole of the battery to the extracting forceps, the handles of which are well insulated, the other pole being held in the hands of the patient. As soon as the forceps come in contact with the tissues about the tooth the circuit is completed, and the electrical effect produced, which is often painful. A committee of the College of Dentists, England, in a report upon the anæsthetic value of electricity, were unanimous that in no case was local anæsthesia produced by such currents, but that the effects were due to "diversion of sensation, less difficulty of extraction as compared with other extractions, syncope more or less marked, and differences in methods of operating." (See Electricity as a Therapeutic Means, etc.)

Obtunding agents or Local Anæsthetics, such as cocaine, eucaine, tropacocaine, chloretone, pyrethrum, aconite, chloral, veratria and alcohol, or chloroform, aconite, belladonna, opium

and carbolic acid, etc., are employed with satisfactory results. One of the most recent and valuable local anæsthetics is Novocaine, especially when it is combined with adrenalin chloride. The efficacy and safety of Cocaine is also increased by combining it with Adrenalin chloride. (See recipes for obtunding mixtures and local anæsthetics.) For, although entire insensibility to pain cannot in all cases be brought about, yet some diminution of it may be effected by the use of such agents. They have the merit, at least, of being less dangerous than the general anæsthetics. Such topical pain-obtunding mixtures may be topically applied to the parts about the neck and over the root of a tooth by means of a simple apparatus, devised by Von Bonhorst. It consists of two small metallic cups, attached to the free ends of a spring some seven inches long, and which contain sponges to hold the liquid. When used, the sponges in the cups are saturated with the obtunding mixture and applied by pressing them on the gum on each side of the tooth to be removed, where they are retained from one-half to two minutes. Previous to the application the patient should be cautioned against swallowing any portion of the mixture.

Pressure Anæsthesia by Compressed Air.—Compressed air is recommended as essential to the dentist for relieving the pain of many operations, and also for securing better results in the action of certain remedial agents by bringing them in closer contact with the tissues to be anæsthetized. It has been successfully employed by a method which consists in forcing, by compressed air with an even and constant force, an obtunding agent into the tubuli of the dentine, in cases of hypersensitiveness. It is a more simple method of obtunding than that of cataphoresis, electricity being the pressure in the cataphoric method.

Some twenty-five to thirty or forty pounds of air-pressure are sufficient, which can be secured by an apparatus designed for the purpose, which will produce double the amount of pressure in air than in water. A solution of cocaine in sulphuric ether—vapocaine, for example, has the advantage of easy access to the tubuli of the dentine, on account of the ether holding the cocaine and finding its way into the tubuli, when it evaporates leaving the cocaine, which then combines with the fluid present.

Besides its use as an obtundent of sensitive dentine, com-

pressed air may be also used to diffuse medicines in root-canals, and into the pus-pockets of alveolar pyorrhœa, in bleaching teeth, in forcing out blood and pus in pyorrhœa, in forcing back the gum and contents of such pockets, as a spray, and as a desiccant of pulp-canals, in drying cavities in teeth, and also drying the mouth in rapidly hardening cement fillings with warm air, in cooling impressions of modeling compound, or wax, in keeping dry the banding of a root by forcing back the blood and gum, in setting crowns and bridge-work, etc. In the apparatus employed, the outlet of air is under control so as to secure an even and constant pressure, and the supply is controlled by a cut-off.

Liquid Air.—The temperature of liquid air is 312° F. below zero. It is applied in the form of spray. Liquid air has received attention from a surgical standpoint in regard to its efficacy as a local anæsthetic, in the treatment of ulcers, opening abscesses, for relief of facial and other forms of neuralgia, sciatica, herpes zoster, erysipelas, etc. Dr. A. C. White states, after experimenting with liquid air, "I first began the use of liquid air in the local treatment of ulcers of the leg chiefly varicose, many chaneroids and some specific ulcers. So many of these cases have now been treated with liquid air that it can be said with positiveness that we have nothing at our disposal to-day which will so quickly, thoroughly, and with so little pain clear up the edges and stimulate the surface of an ulcer to granulations as liquid air does when properly applied. The application should not be made so frequently as to break down the new granulations as they form. After the first two applications to an ulcer, one application a week is usually sufficient. All ulcerations treated with liquid air seem to do better when followed by a dry dressing, such as aristol, subgallate of bismuth, or stearate of zinc, instead of any ungent. An abscess, boil, or carbuncle, in the early stage is aborted absolutely in one thorough freezing. If it is more advanced, several applications at intervals of twenty-four hours are necessary. Whenever pus has formed in large quantity it is advisable to anæsthetize with liquid air, incise and evacuate. In case of carbuncle and bubo well advanced, it is unnecessary to curette if the liquid air is applied generously to the base of the abscess after incision. No sloughing follows except in the case of fairly well advanced carbuncles, and in some

of the abscesses, when the overlying skin has become devitalized from tension and inflammation." In applying liquid air it is better to apply it intermittently while the operator is working than to try to freeze the part so that it will remain senseless for any length of time. This intermittent use of the spray would not be necessary when a simple incision was required as in the case of opening an abscess. In all such cases it is applied in the form of spray.

Dental Uses.—As a local anæsthetic to relieve the pain of all inflammatory and ulcerated conditions, such as pericementitis, alveolar abscess, ulcers, pulpitis, etc.; also to abort pericementitis, and alveolar abscesses in their incipient stages; also for opening abscesses, and in the treatment of ulcers.

Rapid Breathing as a Pain Obtunder.—A method first suggested by the late Dr. W. G. A. Bonwell, and from which he claimed a similar effect to that of ether, chloroform and nitrous-oxide gas in their primary stages, and to render the patient sufficiently unconscious to any acute pain from any operation, where the time consumed is not over from twenty to thirty seconds. "While the special senses are in partial action, the sense of pain is obliterated and, in many cases, completely annulled, consciousness and general sensibility being preserved." "To accomplish this, each patient must be instructed how to act and what to expect. As simple as it may seem, there is a proper and consistent plan to enable you to reach full success. Before the patient commences to inhale he is informed of the fact that while he will be unconscious of pain, he will know full or partially well any touch upon his person; that the inhalation must be vigorously kept up during the whole operation, without for an instant stopping; that the more energetically and steadily he breathes, the more perfect the effect. It is obligatory to do so, on account of its evanescent effects, which demand that the patient be pushed by the operator over energetic appeals to 'go on.' It is very difficult for any one to respire over one hundred times to the minute, as he will become by that time so exhausted as not to be able to breathe at all. For the next minute following the completion of the operation, the subject will not breathe more than once or twice. Very few have force enough left to raise hand or foot. The voluntary muscles have nearly all been

subjugated and overcome by the undue effort at forced inhalation of one hundred and seventeen, the normal standard.

"The heart's action is not increased more than from seventy (the average) to eighty and sometimes ninety, but is much enfeebled, or throwing a lesser quantity of blood. The face becomes suffused, as in blowing a fire or in stooping, which continues until the breathing is suspended, when the face becomes paler. (Have not noticed any purple, as from asphyxia by a deprivation of oxygen.) The vision becomes darkened, and a giddiness soon appears. The voluntary muscles farthest from the heart seem first to be affected, and the feet and hands, particularly the latter, have a numbness at their extremities, which increases until, in many cases, there is partial paralysis as far as the elbow, while the limbs become fixed. The hands are so thoroughly affected, that when open the patient is powerless to close them, and *vice versa*. There is a vacant gaze from the eyes, and a looking into space without blinking of the eyelids for a minute or more. The head seems incapable of being held erect, and there is no movement of the arms or legs, as is usual when in great pain. There is no disposition on the part of the patient to take hold of the operator's hand or interfere with the operation." Dr. Bonwell based his method on the following theory:—

1. Diversion of the will-force in the act of forced respiration at a moment when the heart and lungs have been in normal reciprocal action (twenty respirations to eighty pulsations); which act could not be made and carried up to one hundred respirations per minute without such concentrated effort that ordinary pain could make no impression upon the brain while this abstraction was kept up.

2. There is a specific effect resulting from enforced respiration of one hundred to the minute, due to the *excess of carbonic acid gas set free from the tissues*, generated by this enforced normal act of throwing into the lungs *five times* the normal amount of oxygen demanded in one minute, when the heart has not been aroused to exalted action, which comes from violent action in running, or where one is suddenly startled; which excess of carbonic acid cannot escape in the same ratio from the lungs, since the heart does not respond to the proportionate overaction of the lungs.

3. Hyperæmia is the last in the chain of effects; which is due

to the excessive amount of air passing into the lungs, preventing but little more than the normal quantity of blood from passing from the heart into the arterial circulation, but damming it up to the brain, as well as throughout the capillary and venous systems as well as upon the heart, the same as if it were suspended in that gas outside the body.

Dr. A. Hewson agrees with Dr. Bonwell as to the efficacy of rapid breathing as a pain obtunder, yet he differs with him as to the theory or nature of the changes in the different symptoms brought about during its progress. Dr Hewson states: "Every circumstance would therefore seem to indicate that this process of inducing insensibility to pain is one essentially of diminished oxidization and decarbonization of the blood, and recognizing such a state as belonging to the initative stage of all anæsthetics, when *insensibility to pain* is positively marked, we have no necessity for begging any special theory for this process, as in its action it readily comes under the category of such agents, and is thus not either an *absurdity* or an impossibility from a scientific point of view."

ACTOL—SILVER LACTATE.

Formula.—$AgC_3H_5O_3 = H_2O$.

Therapeutic and Dental Uses.—Actol occurs in the form of a white, tasteless, and inodorous powder, soluble in 20 parts of water, and is recommended as a surgical antiseptic and germicide. It is used as a hypodermic injection in erysipelas; as a wash, a teaspoonful of the solution (1.50) to a glass of water. An aqueous solution (1.100) will destroy all pathogenic microbes within five minutes.

Dr. Harlan states that he has used actol in suppurating pockets on the sides of roots of teeth with excellent results.

It will stain the cementum, but such stains are as easily removed as those from nitrate of silver. Actol causes no pain when used as strong as a twenty per cent. solution.

Silver Citrate is another silver compound which is germicidal in its action. It is in the form of a white powder slightly soluble in water, and is employed in a solution of 1:4000. When used it should be freshly prepared. An ointment is also employed of one to two per cent.

ADRENALIN.

Adrenalin is the active principle of the suprarenal gland, and is in the form of white, non-hygroscopic, polymorphous crystals which change color on exposure to the atmosphere. It is used in the form of *adrenalin chloride* which is obtainable in the strength of 1:1000 in normal salt solution.

Derivation.—The suprarenal gland of sheep or oxen is disintegrated and extracted with water, and the extract treated with alcohol to throw down the organic and inorganic non-active constituents. The filtrate is then evaporated in a vacuum to proper consistency and treated with alkaline substances, a process which extracts the active principle in a crystalline form; this is purified by repeating a similar method.

Medical Properties and Action.—Adrenalin chloride is hemostatic, astringent and a cardiac tonic, and is considered to be the most efficient hemostatic and astringent in use. It does not coagulate albumin. If it is administered before chloroform anæsthesia, it is claimed that the heart will withstand larger doses; also that it not only supports the heart in deep anæsthesia, but it prevents the absorption of cocain and the consequent systemic effects of that agent, when a preliminary application of the solution adrenalin chloride is made to the parts to be anæsthetized, which is due to the prophylactic power of adrenalin, as this agent reduces the caliber of the blood vessels whose capacity for absorption is thus reduced to the minimum, and the local action of the cocaine upon the peripheral nerve ends is not interfered with. Adrenalin chloride solution is very effective for arresting epistaxis, and hemorrhage following operations; the best means for using it is by local application to the bleeding vessels.

Dose of Adrenalin chloride solution 1:1000, internally is 5 to 30 ♏.

Dental Uses.—The practical use of adrenalin is apparent in the adrenalin chloride solution 1:1000 in the hemorrhage following tooth extraction, extirpation of the dental pulp, the treatment of spongy gums, the excision of polypi, fungous growths, empyema of antrum and the painless extirpation of the pulps of teeth.

Dr. Clyde Davis' method of performing painless pulp extirpation is to first apply a drop of adrenalin chloride solution; then a few crystals, or a one-sixth grain soluble tablet; apply, gradually increasing pressure with rubber plug (unvulcanized rubber) or bees' wax, for about three minutes; then use the broach. Final hemorrhage is checked by applying adrenalin alone. Dr. I. I. E. De Vries recommends the following pressure method: "Place in the cavity a small piece of cotton saturated with adrenalin-cocaine (5:1), leaving it there for from three to five minutes. Excavating with no pain at all is possible, and where not exposed, expose the pulp quickly with the aid of a sharp fissure bur. Apply again the adrenalin-cocaine, put in a piece of unvulcanized rubber, and under slowly increasing pressure impregnate the whole pulp. Open pulp chamber widely and extirpate immediately." Solutions of adrenalin with cocaine for painless extraction, etc., can be readily prepared by dissolving one hypodermic tablet of adrenalin and cocain, in a small quantity of distilled water, or the physiologic salt solution. These tablets contain 1/300 grain of adrenalin and 1/6 grain of hydrochlorate of cocaine.

Codrenin.—Cocaine in 1 per cent. solution with adrenalin 1:5000. Each fluid ounce contains of cocaine 4 3/5 grains; adrenalin chloride 1/12 grain, and chloretone 2 1/4 grains (0.5 per cent.). Codrenin is a local anæsthetic and styptic, useful in the extraction of teeth and other operations. It may be used in full strength or otherwise, or it can be diluted to any strength desired. It is claimed that adrenalin with the cocaine localizes the action of the latter and prevents its immediate absorption into the blood, and thus secures anæsthesia by the use of a much smaller quantity of cocaine. Codrenin is used hypodermically as a local anæsthetic; it is also used as a styptic.

Dr. Harwig, of Vienna, claims that he finds that a solution containing 0.2 per cent. of the anæsthetic produced almost the same effect as 2 per cent. cocaine solutions without the adrenalin; he now ordinarily employs a 0.5 per cent. solution of cocaine with adrenalin, and for grave cases 1 to 1.5 per cent. Codrenin may be used in full strength, or it can be diluted to any strength desired by the addition of the necessary physiological salt solution or boiled water. It is also claimed that there will be

much less bleeding after extraction than if no adrenalin is used with the cocaine. The codrenin should be kept in a dark place and tightly stoppered.

ALCOHOL.

Ethylic Alcohol. Spiritus Vini Rectificatus.

Formula.—C_2H_5OH. Sp. gr. of officinal alcohol, 0.820; of rectified spirit—*Spiritus Rectificatus*, 0.838; of stronger alcohol—*Alcohol Fortius*, 0.817; of diluted alcohol—*Alcohol Dilutum* (equal parts of alcohol and distilled water), 0.928. *Absolute Alcohol* 99 per cent.

Derivation.—Alcohol is obtained from vinous or fermented liquors by repeated distillations, and, in its officinal form, contains about fifteen per cent. of water. It is colorless, inflammable, wholly vaporizable by heat, and unites in all proportions with water and ether. It frequently contains such impurities as fusel or amylic alcohol (obtained from fermented grain or potatoes); the presence of which can be detected by agitating the alcohol with sulphuric acid, when the former becomes colored.

Stronger Alcohol.—*Alcohol Fortius—Absolute Alcohol*—is obtained by agitating the officinal alcohol with heated carbonate of potassium. Sp. gr., 0.794, when containing no water.

Medical Properties and Action.—All the different forms of alcohol, including brandy—*Spiritus Vini Gallici* (the spirit obtained from fermented grapes by distillation, and containing 45 to 55 per cent., by volume, of absolute alcohol); whisky—*Spiritus Frumenti* (the spirit obtained from fermented grain by distillation, and containing from 50 to 58 per cent., by volume, of absolute alcohol); wine—*Vinum* (the fermented juice of the grape, and containing alcohol in varying proportions) are powerful diffusible stimulants, increasing the action of the heart and arteries, exciting the nervous and vascular systems, and causing a general exhilaration of spirits. Excessive quantities produce the effect of narcotic poisons, ending in coma and death. Prof. Abel, of Johns Hopkins University, says of alcohol that it is an easily oxidizable drug with numerous untoward effects, which inevitably appear when a certain minimum dose is exceeded.

The habitual use of alcoholic drinks causes most injurious

effects upon the system generally and directly upon the mucous coats of the stomach, deranging and destroying its functions and structure, resulting in dyspepsia, followed by cirrhosis of the liver and kidneys, loss of mental and physical strength, derangement of the nervous system, and at last, delirium tremens. When properly administered in diseased conditions, however, alcoholic preparations are valuable agents. Used in combination with other substances it is preservative and solvent.

Therapeutic Uses.—The different forms of alcohol are employed as stimulants in acute inflammations, such as pneumonia, pleurisy, bronchitis, pulmonary affections of children, etc., etc., and in rheumatic pericarditis, in the latter stages of typhus and typhoid fevers, diphtheria, acute neuralgia, convulsions of dentition, tetanus, asphyxia from cold, pyemia, etc., etc. Externally in superficial inflammation, bruises, sprains, ptyalism, gout, cerebral affections, bed sores, etc., etc. According to Bartholow, alcohol is an excellent hemostatic for restraining oozing from a large surface, and an efficient antiseptic dressing, as it destroys germs, removes fetor, and stimulates the tissues to more healthy growth.

Dental Uses.—Alcohol, as a narcotic, is employed to relieve pain. In combination with tannic acid or chloride of zinc, it obtunds the sensibility of dentine; as a styptic, it arrests hemorrhage from relaxed tissues, coagulating the blood by its effect on albumen, and causing contraction of the mouths of the vessels by its astringent property. Equal parts of alcohol and water make an excellent application as an evaporating lotion, for the relief of superficial inflammations, its antiseptic properties rendering it useful as a mouth-wash when the secretions are vitiated and the surfaces of the mucous membrane soft and spongy. It is also useful for cleaning pulp canals as a preparatory treatment to the use of the more active antiseptic agents, such as the bichloride of mercury For suppurating wounds, it is a useful antiseptic dressing, as it destroys germs, removes fetor, and stimulates the tissues to a more healthy action. It also favors the cicatrization of open wounds, coagulating the albumen, and forming an impermeable covering. In mercurial salivation (mercurial stomatitis), it forms an excellent gargle.

For softened and sensitive dentine, and for drying cavities pre-

paratory to filling them, the stronger or absolute alcohol is employed. The spray of absolute alcohol is employed as a local anæsthetic, and is applied in the same manner as the spray of rhigolene. A simple method of preparing this form of alcohol is to add one part of carbonate of potassa to four parts of the ordinary or officinal alcohol. Owing to the great affinity carbonate of potassa has for water, it abstracts the latter from the alcohol to a sufficient degree to answer all practical purposes.

The cavity of a tooth is first dried with cotton and bibulous paper, and then bathed with the absolute alcohol, which at once evaporates, and causes the almost perfect absorption of moisture.

Brandy and water form, in combination, an excellent lotion for mercurial and other forms of stomatitis.

DENTAL FORMULÆ.

For Obtunding Sensitive Dentine.

℞ Alcoholis (absolute) . ℥ss
Acidi tannici . . . . ℥ss
Glycerini . . . . . ℥ss. M.

For Superficial Inflammations.

℞ Alcoholis
Aquæ . . . . . āā ℥ss. M.
SIGNA.—To be applied as a lotion.

For Obtunding Sensitive Dentine.

℞ Alcoholis (absolute) ℥ss
Zinci chloridi . . . . ℥ss
Glycerini . . . . . ℥ss. M.

For Mercurial Stomatitis.

℞ Spts. vini gallici . . . 1 part
Aquæ . . . 4 to 6 parts. M.
SIGNA.—To be used as a gargle.

Antiseptic Bath for Instruments.

DR. A. W. HARLAN.

℞ Alcoholis . . . . . ℥ij
Hydronaphthol . . grs.xx. M.
Will not tarnish instruments which are dipped in it and allowed to dry.

Local Anæsthetic.

DR. A. W. HARLAN.

℞ Alcoholis . . . . . 5 parts
Tinct. Cannabis indica 2 parts
Oleum cassiæ . . . 1 part
Acidi carbolici . . 3 parts. M.

SIGNA.—For injection, or on cotton rope around tooth.

Antiseptic Mouth Wash.

GALLIPE AND MALASSEZ.

℞ Alcohol 370 parts
Carbolic Acid . . 10 parts
Thymol . . . . 5 parts
Oil of peppermint 15 parts
Tincture of arnica 100 parts. M.
This may be colored with tincture of cochineal.

SIGNA.—Use twice a day and at same time rinse out the mouth with a weak solution of boric acid.

For Pain After Extraction of Teeth.

Dr. T. B. Welch.

℞ Alcohol (best) . . . ℥j
Chloroform . . . . . ℥ij
Sulphuric ether . . . ℥3/4
Gum Camphor . . . ℥ss
Tinct. opium . . . ℥j
Oil cloves . . . . . ℥ss.

Signa.—Apply in the cavity on a pledget of cotton.

For Odontalgia.

Dr. J. N. Harris.

℞ Alcoholis (best) . . ℥j
Chloroformi . . . . ℥ij
Etheris Sulph . . . ℥3/4
Camphoræ (gum) . . ℥ss
Tinct. opii . . . . . ℥1/8
Oleum caryophilli . . ℥ss.

Signa.—Apply to cavity, and soon as pain ceases fill the cavity with cotton moistened with carbolic acid and oil of cloves; drop on this cotton sandarach varnish, and allow it to remain 20 or 30 minutes.

Local Anæsthetic.

Dr. I. Alberto del Solar.

℞ Alcoholis (98 per cent.) f℥ij
Chloroformi . . . . f℥iv
Ether, sulph. . . . . f℥iss
Camphoræ . . . . . ℥j. M.

Signa.—Apply to the gum 1 minute bucally and lingually, first carefully drying the surface. Not to be used hypodermically.

ALKATHYMOL.

Alkathymol is a combination of which each fluid ounce contains: Sodium borate, 4 grs.; sodium bicarbonate, 8 grs.; sodium sulphate, 3 grs.; sodium chloride, 6 grs.; sodium phosphate, 1 gr.; menthol 1/2 gr.; thymol, 1/4 gr.; eucalyptol, 1/8 min.; oil Pinus Pumilio, 1/8 min.; glycerine, 60 mins.; chloretone, 1/4 gr. It is antiseptic, germicide, deodorant and detergent. Alkathymol is employed as a sanitary mouth-wash and germicide; it neutralizes acids formed in the mouth, and destroys the germs that generate them. As an antiseptic mouth wash, it relieves inflammation of the gums, tonsils and throat, and renders spongy gums firmer, and is useful in correcting, as well as preventing the soreness and irritation caused by artificial dentures. It acts as a detergent in the proportion of one tablespoonful of alkathymol to three of water. For use as a gargle, or in the form of a spray, it is diluted with from three to eight parts of water.

ALUMEN—ALUM.

Aluminum and Potassium Sulphate.

Formula.—Common potash alum: $Al_2(SO_4)_3$, $K_2SO_4 24H_2O$. Ammonium Alum: $Al_2(NH_4)_2(SO_4)_4$, $24H_2O$. Potassium alum is different from ammonium alum.

Source.—It is found native in Italy, in the neighborhood of volcanoes, and is the mineral from which the metal aluminum is obtained.

Derivation.—Alum is also obtained from aluminous slate, shale or schist, by the process of roasting and exposure to the air.

Potassium alum is a white, slightly efflorescent salt, which crystallizes, in large, colorless regular octahedrons. It possesses an astringent, acid, and sweet ish taste. It is insoluble in alcohol, but dissolves in nine parts of cold water or three parts of glycerine.

Medical Properties and Action.—Alum is astringent, antiseptic, and styptic, and is employed both externally and internally. When taken internally, it is absorbed into the system, and has been detected in the liver, spleen and urine. Excessive doses cause vomiting, griping, purging, and inflammation of the gastro-enteric mucous membrane. Powdered alum, in doses of a teaspoonful, is an efficient emetic. It coagulates albumen and causes an abundant flow of saliva, coagulating the albumen of the saliva and buccal mucus in whitish, membranous flakes.

Its astringent influence is chiefly upon mucous surfaces. Applied locally to relaxed or bleeding parts, it corrugates the surrounding tissues and causes contraction of the capillaries, and, in this manner, acts as an astringent.

Therapeutic Uses.—Alum is internally administered in diarrhœa, chronic dysentery, colica pictonum, catarrh of the stomach, etc. Externally it is applied in ulcerated and relaxed throat affections, ptyalism, gonorrhœa and gleet, uterine hemmorrhage, morbid growths, hematuria, ophthalmia, chronic whooping-cough chronic skin diseases, chilblains, ulcers, hospital gangrene, etc., it is serviceable in chronic inflammations of the mouth and throat, and especially in those cases where there is a lack of gingival tone and passive relaxation of mucous membrane.

Dose.—Of alum, gr. x to ℈j or ℈ij, in powder, or solution in water, or in some simple infusion.

Ammonia Alum.—Sulphate of alumina and ammonia—*Aluminæ et Ammoniæ Sulphas*—is prepared by adding sulphate of ammonia to a solution of sulphate of alumina.

Dried Alum.—*Alumen Exsiccatum* (alum deprived of its water of crystallization by heat, becoming opaque and amorphous

—is employed externally as a mild escharotic, to destroy exuberant granulations, etc.

Dental Uses.—Alum is employed in dental practice as a styptic in alveolar hemorrhage; as a gargle in stomatitis, ulceration, and sponginess of the gums, morbid or fungous growth of gums, dental pulp, etc., superficial hemorrhage from the mucous membrane of the mouth, ulcers of the mouth, cancrum oris, odontalgia, after the extraction of teeth—one drachm in a tumbler of water, etc., etc. In congested conditions of the mucous membrane of the mouth and throat, alum gargles afford great relief. Powdered alum added to liquor sodæ chlorinatæ (Labarraque's Solution), is an excellent bleaching application for discolored necrosed teeth.

The habitual use of alum as an ingredient of a dentifrice is injurious to the teeth, on account of the sulphuric acid it contains.

Potash alum—*Aluminii et Potassii Sulphas*—the alum of commerce (which has been superseded by ammonia alum), will render plaster casts hard, when they are boiled in a strong solution for half an hour. A saturated solution of alum will hasten the setting of plaster of Paris, and prevent expansion of the cast.

DENTAL FORMULÆ.

For Odontalgia.

℞ Pulveris aluminis . . ʒij
Ætheris nitrici . . . ʒvij.
SIGNA.—To be applied on a pellet of cotton.

For Inflamed and Ulcerated Mucous Membrane and Gums.

℞ Pulveris aluminis . . gr.lxxx
Aquæ destillatæ . . . fʒx. M.
SIGNA.—To be applied as a mild astringent gargle.

For Ulceration of the Gums and Mucous Membrane of the Mouth.

℞ Aluminis . . . . . ʒj
Zinci sulphatis . . . ʒss
Sodii borat . . . . gr.iv
Aquæ rosæ . . . . ʒviij. M.
SIGNA.—To be applied as a lotion.

For Ulcerated and Spongy Gums.

℞ Aluminis . . . . . ʒj
Vini . . . . . Oj
Tinct. cinchonæ . . . ℥ss
Tinct. myrrhæ . . . ʒij
Mel. rosæ . . . . . ℥ij. M.
SIGNA.—To be used as a gargle.

For Inflammation and Ulceration of the Mouth and Throat.

℞ Infus lini . . . . . ʒxv
Tinct. kino . . . . . ʒj
Aluminis . . . . . ʒij. M.
SIGNA.—To be applied as a gargle.

For Pulp Sterilization.

DR. THEO. SODERBERG.

℞ Alum exic . . . . .
Thymol . . . . . .
Glycerol . . . . . āā. ʒj.
Zinc oxid, q. s. to make a stiff paste.

ALUMINÆ ACETAS—ACETATE OF ALUMINA.

Formula.—$Al_2(OH)_2(C_2H_3O_2)_4$.

Derivation.—The salt, Acetate of Alumina, is obtained by the direct combination of hydrated alumina with acetic acid, or by reaction between sulphate of alumina and acetate of lead. The solution, when properly prepared, is a clear fluid, of a sharp, sweetish, astringent taste, and a distinct odor of acetic acid. When it is evaporated, there is deposited light, fragile, glossy scales, which are perfectly soluble in water, and not readily affected by the atmosphere.

Medical Properties and Action.—It is disinfectant and anti, septic. In maximum doses it produces an nulpeasant sensation of warmth and fullness in the stomach, and at the same time, vertigo and confusion of the senses, which may continue for several hours.

Therapeutic Uses.—Acetate of alumina is rarely employed internally, and only for zymotic and contagious diseases. It is generally used externally, and is a very effectual remedy in the treatment of wounds, preventing pyemia in suppurating wounds and ulcers. It is also applied in parasitic skin affections, as an injection in gonorrhœa, and for the destruction of animalculæ in putrescent fluids. As a surgical dressing, it is used by keeping the wound saturated with a solution of moderate strength, or by irrigation. A concentrated solution will preserve anatomical subjects for a considerable time.

Dose.—Of acetate of alumina, gtt. xx to gtt. 60 of the solution.

Dental Uses.—Acetate of alumina is useful in dental practice, as an antiseptic and disinfectant in cancrum oris, ulcers of the mouth, suppurating wounds of mucous membrane, pyorrhœa alveolaris, alveolar abscess, etc. A very weak solution has been employed as a mouth-wash for offensive breath depending on scrofulous ulceration, aphthæ, caries of the teeth, or the wearing of artificial teeth.

AMMONIUM—AMMONIA.

Formula.—NH_4.

Ammonia, often called ammoniacal, or ammonia gas, is colorless and readily soluble in water, and forms a number of

volatile stimulants, such as *Aqua ammoniæ*—ammonia water, which is the stronger water of ammonia diluted with two parts of water; *Aqua ammoniæ fortior*—stronger water of ammonia, is made by passing ammonia gas into water to make its specific gravity, 0.900 at 59° F.; *Spiritus ammoniæ*—which is a ten per cent. solution of ammonia gas in alcohol; *Spiritus ammoniæ aromaticus*, which is an alcoholic, or rectified spirit, solution of carbonate of ammonium, to which are added oils of lemon, nutmeg, and lavender. (See also muriate of ammonia, sal-ammoniac, carbonate of ammonium, solution of acetate of ammonia, spirit of mindererus, chloride of ammonium, and valerianate of ammonium.)

Medical Properties and Physiological Action.—Ammonia gas is very alkaline, and an irritant to mucous surfaces. Inhaled, it causes an overpowering sense of suffocation and spasm of the glottis, and when prolonged, violent inflammation of the air-passages. Solution of ammonia when swallowed causes destructive inflammation of the mucous membrane, extending to the stomach. The long-continued use of ammonia interferes with digestion by neutralizing the gastric juice, and by increased waste of tissue causes pallor, emaciation, and feebleness. In the blood it injures the red blood globules, and thus affects the nutrition of the body, being largely converted into urea. The preparations of ammonia are stimulant expectorants.

Therapeutic Uses.—Aqua ammonia is administered by inhalation in syncope and shock, and as a counter-irritant; for which purpose ammonia liniment is also employed. The incautious inhalation of ammonia may cause inflammation of the fauces and glottis, but when cautiously employed sometimes gives relief to acute catarrh and hay asthma. The diluted aqua ammonia will relieve the pain of stings of insects, and the strong aqua ammonia is an antidote, when at once applied, to the bite of venomous snakes, and of rabid animals. The aromatic spirits of ammonia is useful in acidity of stomach, gaseous eructations and abdominal distentions; also in sick headache and migraine; but the bromides are more effective in the latter affection. Ammonia salts stimulate the liver and increase the secretions of the kidneys and intestinal mucous glands and the action of the heart, hence are frequently used in adynamic states, constipation, coated

tongue and scanty urine. The preparations of ammonia for internal use correct obstinate vomiting when the irritating substances are removed, and the matters vomited are acid.

Dose.—Of Aqua Ammoniæ, ♏v to ℥ss, much diluted; of Spiritus Ammoniæ, ♏x to f℥j, greatly diluted; of Spiritus Ammoniæ Aromaticus, f℥ss to f℥ij.

Dental Uses.—Ammonia is used as a stimulant in dangerous narcosis; to prevent syncope or severe shock; in facial neuralgia, especially the chloride, and in periodontitis, when it is combined with aconite and opium. Aqua ammonia is locally applied as a counter-irritant to the gums in acute inflammation of the peridental membrane. (See Acetate, Carbonate, Valerianate and Chloride of Ammonium.)

Aromatic Spirits of Ammonia, or Sal Volatile, is one of the most diffusible stimulants and is antacid and carminative. It is employed for syncope resulting from shock, dental operations, etc., and acts as a stimulant where alcohol is contraindicated. As an antacid is serviceable in acid conditions of the oral fluid, in superficial caries of the teeth, erosions, and sensitive necks of teeth.

LIOUOR AMMONII ACETATIS—SOLUTION OF ACETATE OF AMMONIA.

SPIRIT OF MINDERERUS.

Formula.—$NH_4C_2H_3O_2$.

Derivation.—Spirit of Mindererus is obtained by saturating diluted acetic acid with carbonate of ammonia, being a solution of the acetate of ammonia,

It is a colorless liquid, with a saline taste, and requires to be freshly made when about to be used.

Medical Properties and Action.—It is refrigerant, diaphoretic, and diuretic, and its action can be greatly increased by combination with other remedies. Few medicines are in more general use.

Therapeutic Uses.—Spirit of mindererus is employed in the treatment of febrile and inflammatory affections, and exanthemata, sick headache, catarrh and influenza, etc., etc. Externally it is used as a lotion to sprains, bruises, glandular enlargements, etc.

Dose.—Of spirit of mindererus, f℥j to f℥j.

Dental Uses.—A lotion composed of one part to ten of water is a serviceable application in inflamed conditions of mucous membrane. Internally administered as a refrigerant it is useful in acute periosteal inflammation, inflammation of the dental pulp —pulpitis, and is a diaphoretic and refrigerant in periodontitis, when it may be combined with either aconite or opium, or both.

AMMONII CARBONAS—CARBONATE OF AMMONIUM.

Formula.—NH_4HCO_3, $NH_4NH_2CO_2$.

Derivation.—Carbonate of Ammonium is a sesquicarbonate, and is obtained by subliming a mixture of chloride of ammonium and chalk. It is in the form of white, translucent masses, with a pungent ammoniacal odor, and an acrid, alkaline taste. It is soluble in water, and on exposure to the air it becomes opaque and falls into powder, losing its ammonia.

Medical Properties and Action.—It is antacid, stimulant, diaphoretic and expectorant, and it is considered to be especially useful in cases where the vital powers are greatly depressed. In large doses it causes colic, convulsions and great disturbance of the nervous system, and when long continued an annoying itching of the scalp, and skin over the surface of the body. It has a tendency to fluidify the blood. Internally, as a diffusible stimulant, it is preferred to solution of ammonia.

Therapeutic Uses.—It is internally administered in diabetes, scrofula with languid circulation, asthma, pneumonia, croup, chorea, diseases of the skin, puerperal insanity, mercurial erethism, drunkenness, etc., etc.

Externally it is employed as a volatile or smelling salts, in syncope, hysteria, and asphyxia.

Dose.—Of carbonate of ammonium, gr. v to gr. x, in pill or in solution with gum and sugar.

Dental Uses.—It is a useful internal remedy in cancrum oris, in doses of gr. v, gradually increased to gr. x, every two or three hours, using strong nitric acid as a local application. It is also a very useful remedy in mercurial erethism, in conjunction with camphor and other stimulants; also as a stimulant in dangerous narcosis from anæsthetic agents.

AMMONII CHLORIDUM—CHLORIDE OF AMMONIUM.

MURIATE OF AMMONIA—HYDROCHLORATE OF AMMONIA—SAL AMMONIAC.

Formula.—NH_4Cl.

Derivation.—Chloride of Ammonium is obtained by neutralizing hydrochloric acid with ammonia and evaporating to dryness. It is in the form of a snow-white, crystalline powder, soluble in two and a half parts of cold water, and sparingly soluble in alcohol. It has a pungent, saline taste.

Medical Properties and Action.—In large doses it is an irritant poison, with a purging action; but in small doses it is a powerful resolvent alterative; it is also refrigerant and anodyne. Its action upon the system closely resembles that of mercury as an alterative.

Externally it is used as a discutient application, and as a cold lotion in fevers, hernia, etc.

Therapeutic Uses.—It is employed internally in amenorrhœa, rheumatic affections, chronic bronchitis, pneumonia, dropsical affections, hemorrhages, whooping-cough and myalgia. Externally in abscesses of the mamma, skin diseases, ecchymosis of the eye, hydrocele, senile gangrene, gonorrhœa, leucorrhœa, etc.

Dose.—Of chloride of ammonium, gr. v–xxx, every two or three hours, in powder or mucilage.

Dental Uses.—It is employed in facial neuralgia, in doses of ℥ss, repeated four times daily. Externally it is used as an application to indolent ulcers, for its stimulating effect. As a gargle, it is employed in the strength of ℥ss to ℥xij of water. It is also applied to cancerous tumors, and has been used to restore zinc which has become deteriorated from long use in laboratory work. Chloride of ammonium (sal ammoniac) is also used as a flux, in refining gold for laboratory use.

AMYL NITRIS—NITRITE OF AMYL.

Formula.—$C_5H_{11}NO_2$. Sp. gr., 0.877.

Derivation.—Nitrite of Amyl is prepared by the action of nitric acid on amylic alcohol (fusel oil). The distilled portion obtained below 212° F. is rectified by means of carbonate of potas-

sium, and that portion only distilling between 200° and 206° F. is reserved, being a nitrite of oxide of amyl. It is a yellowish or amber-colored liquid, somewhat oily, very volatile and inflammable, and boils at 182° F. It has an odor like that of ripe pears, and belongs to the class of compound ethers.

Medical Properties and Physiological Action.—It is used by inhalation, causing an accelerated action of the heart, sudden flushing of the face, dilatation of the arteries, paralysis of the action of the smaller arteries, a sense of great fullness of the brain, a lowering of the blood-pressure and temperature, and complete resolution of the muscular system. The vapor of nitrite of amyl, when applied directly to the muscular or nervous tissues, arrests their functional activity, and, circulating in the blood, appears to act most on the vaso-motor system and unstriped muscular fibre. It affects respiration and the composition of the blood, producing headache, which is often prolonged.

Therapeutic Uses.—Being a powerful stimulant to the heart, it is an antidote to chloroform and cocaine. A case is mentioned in the *British Medical Journal*, where, during chloroform narcosis, respiration ceased, and artificial respiration failed to restore the patient. Some nitrite of amyl was then poured on lint, and held to the patient's nostrils. In ten seconds there was a flushing of the face, the pulse was again felt, and respiration was restored.

When from two to five minims are poured on lint and applied to the nostrils, the heart's action will be accelerated, a sudden flushing of the face takes place, dilatation of the arteries results, also a fall in the blood pressure and a lowering of the temperature, and complete muscular relaxation. As a remedy for chloroform narcosis, is is supposed to antagonize cerebral anemia by causing capillary dilatation and thus promoting the inflow of blood to the brain.

By inhalation, for relieving the pain of angina pectoris, and preventing epileptic seizures; also used in asthma, strychnia poisoning, hydrophobia, tetanus, epileptic attacks, and in many other convulsive or spasmodic diseases.

Dose.—Of nitrite of amyl, ♏ij to ♏v, by inhalation; not more than ♏iij should be administered, unless the patient has been accustomed to its use.

Dental Uses.—As an antidote for chloroform narcosis, for the

relief of epileptic attacks during the extraction of teeth, for relieving the pain of neuralgia of the fifth pair of nerves, and for restoration from syncope. As nitrite of amyl is a powerful and dangerous agent, care must be observed in its use, and but small doses applied at first, as some patients, especially the weak and nervous, are very susceptible to its influence. The symptoms of poisoning by nitrite of amyl are flushing of face followed by pallor, dilated pupils, relaxation of muscles, irregular respiration, pulse slow and weak; there may also be cyanosis. The antidotes are stimulants, external warmth, and artificial respiration.

ANTHEMIS—CHAMOMILE

Source.—The flowers of the *Anthemis Nobilis.* A German variety is known as *Matricaria*, which is similar to Anthemis in its effects. The herb chamomile has a fragrant odor and a bitter, aromatic taste. A volatile acid is obtained from the flowers, which is similar, if not identical, with valerianic acid.

Medical Properties and Therapeutic Uses.—Chamomile is a mild tonic in small doses, but in large doses may act as an emetic. It is used in the form of a cold infusion in enfeebled digestion, flatulent colic and infantile disorders connected with digestive derangement. It is also employed in the form of infusions prepared with hot water and vinegar, for the relief of pain of boils, abscesses, etc. When employed for the relief of odontalgia in the form of fomentations to the face, there is danger of the abscess pointing externally; it is also applied to flabby, ill-conditioned ulcers as a gentle excitant. The tepid infusion will promote the operation of emetics.

Dose.—Of the powder as a tonic, ss ℥to ℥j. It is generally employed in the form of infusion.

ANTIKAMNIA.

Derivation.—Antikamnia (non official) is composed of acetanilid, bicarbonate of soda, and citrate of caffeine, so combined, it is claimed, as to obviate the bad effects caused by many of other organic bodies when administered alone. It is in the form of a white powder with a pungent taste.

Medical Properties, Physiological Action, and Therapeutic Uses.—Antikamnia is an antipyretic, analgesic and anodyne, and causes a quieting influence upon the nervous system, inducing and promoting sleep. It is employed in neuralgia, myalgia, sciatica., acute rheumatism, hemicrania, typhoid fever; also headache and other neuroses due to irregularities of menstruation; also in asthma, hay fever, influenza, la grippe and allied affections.

Dose.—Grs. v to grs. x, every three or four hours.

Dental Uses.—For the relief of nervous irritation, and also neuralgic pain, following dental operations, and the pain due to dental diseases, ten grains of antikamnia will prove serviceable; also in the odontalgia of pregnancy, reflex neuroses, etc. As a local application for pain of an exposed pulp, periodontitis, alveolar pyorrhœa, etc., a five grain tablet may be finely powdered, and rubbed about the affected part; also for the pain following the extraction of teeth it proves serviceable.

To prevent the Disturbance of the Nervous System which Accompanies the Administration of Quinine.

℞ Antikamnia . . . . ℥ss
Sulphate of Quinine ℈ij. M.
Make xii capsules, 1 every 2 or 4 hours as may be indicated.

Analgesic and Anodyne.

℞ Antikamnia . . . . ℥ij
Spts. Vin. Gall . . .
Syr. Aurantii Flor. āā ℥iv. M.
SIGNA.—Tablespoonful every 3 or 4 hours.

Anodyne and Analgesic.

℞ Antikamnia . . . .
Quinia sulph. . . . āā ℥ss
Pulv. Doveri . . . . grs. viii
Soda bicarb. . . . . grs. xij.
Ft. viij capsules.
DOSE.—One capsule every 4 hours.

ANTIPYRINE—DIMETHYLOXYQUINIZINE.

Formula.—$C_{11}H_{12}N_2O$.

Antipyrine is in the form of whitish or grayish-white crystal line powder, slightly-bitter sweetish taste, and soluble in water. It combines with acids for form salts.

Medical Properties and Therapeutic Uses.—Antipyrine is a powerful antipyretic, local anæsthetic, disinfectant, hemostatic and stomachic tonic, and acts as an antiseptic in preventing fermentative changes in the intestines. It is also slightly hypnotic. It stimulates the secretions and readily diffuses into the blood. It first stimulate and then paralyzes the nerve-centres,

dilates the cutaneous vessels, and increases the loss of heat by radiation, reducing the temperature rapidly. Sometimes it may cause dangerous symptoms, such as a feeble pulse, profuse diaphoresis and collapse. It is employed in typhoid and malarial fevers, pneumonia, phthisis, neuritis, sciatica, locomotor ataxis, neuralgia of the fifth pair of nerves associated with neuritis and sciatica, migraine, acute rheumatism, epilepsy, chorea, etc., and as a substitute for morphine, and in the morphine habit.

Its administration is soon followed by profuse perspiration, coldness of the surface, slowed pulse, depression, and if fever is present by lowered temperature within a half-hour after taking the drug. In health its use may cause slight nausea, singing in the ears, and a slight decrease in the temperature of the body. It has no effect upon respiration, but acts as a sedative upon the brain. It is eliminated by the kidneys, appearing in the urine about three hours after ingestion.

Dose.—Grs. v to grs. lx, being determined by its uses. Subcutaneously injected, it is very effective in painful affections originating in the nerves.

The hypodermic use of antipyrine has given very satisfactory results in the treatment of nervous articular and muscular pains, gastric affections, bronchial asthma, articular rheumatism, chronic lumbago. A painless injection may be made by half-filling a hypodermic syringe with a fifty per cent. solution of antipyrine, which will amount to about five and a half grains; then immerse the syringe into a ten per cent. solution of cocaine, drawing up enough of the cocaine into the syringe to make it about three-fourths full; this will amount to one-third grain of cocaine. The two solutions readily mix and do not decompose, and may be used as a local anæsthetic.

Dental Uses.—Antipyrine is used hypodermically with great success in cases of severe neuralgia of the fifth pair of nerves. Also, in cases of acute pericemental irritation, and in reflex neuroses of dental origin it has given great relief. Fifteen grains in half an ounce of water have given relief in a case of pericementitis, ceasing in twenty minutes with no return of the pain: but many prefer antifebrin (acetanilide) as being safer than antipyrine. It also has a marked effect in controlling hemorrhage from the gums and alveolar cavities when used as a hemostatic

after the extraction of teeth. Prof. G. Cesari claims that antipyrine more or less speedily arrests hemorrhage from both large and small blood vessels when applied in solutions of not less than forty or, better, fifty per cent. The solution as well as the powder should be applied on pledgets of cotton wool. Antipyrine has also been administered internally with satisfactory results in the treatment of periodontitis; and in cases where, owing to the severity of the symptoms in the same affection, the internal administration has proven unsuccessful, the hypodermic injection of fifteen grains has afforded relief; or the hypodermic injection followed in one half hour by the internal administration of fifteen grains of the drug will afford relief in cases of acute periodontitis.

Antipyrine has been successfully used for arresting hemorrhage after the extraction of teeth, as it has none of the disagreeable effects of perchloride of iron. It is applied on cotton.

For Nervous Cases.

℞ Antipyrine . . . . . gr.xviij
Aq. destillat . . . . . q. s. ad ft. sol.
Ft. sol et adde . . . . . .
Acidi valerianici . . . . . gtt.xv.
Shake well and stand aside to allow salt to crystallize.

Local Anæsthetic.

Dr. J. E. Davis.

℞ Antipyrine (5 per cent.) . . . . . grs.xxiij.
Cocaine (10 per cent.) grs.48
Menthol . . . . . grs.v.
Oil cloves . . . . . gtts. iij
Ether. . . . . gtts.xx
Glycerine . . . . . ℥j
Water (pure) . . . . . ℥j. M.
Signa.—Use with hypodermic syringe.

ANTISEPTIC AND STYPTIC COTTON-WOOL.

Antiseptic Cotton.—First free the ordinary cotton wool from grease, by macerating it in benzine for ten minutes, press and dry in the air. Then steep the purified cotton, for ten minutes, in a solution of tannin 5, carbolic acid 4, alcohol 50, and castor oil 8 parts.

Styptic Cotton-Wool.—Purify, as before, with benzine, dry in

air, and then steep it in a solution of alum 2, water 12, chloride of iron solution 2 parts; dry at 60° C.

AQUA DESTILLATA—DISTILLED WATER.

Derivation.—"Take of water 80 pints. Distill two pints, using a tin or glass condenser, and throw them away; then distill 64 pints, and keep them in glass bottles."—U.S.D.

Properties.—Distilled water has a vapid, and by no means pleasant taste, and is only perfectly pure when the vessel used in the distillation is of silver. It should evaporate without residue.

Therapeutic Uses.—It is very essential in the preparation of some formulæ, and of no use whatever in others, as the common pure water will answer. Such agents as tartar emetic, nitrate of silver, corrosive sublimate, chlorides of calcium, barium, acetate and subacetate of lead, permanganate of potassa, the sulphates of iron and zinc, sulphate of quinia, the salts of morphia, and all the alkaloids and their salts, require, when given in solution, distilled water.

Dental Uses.—Distilled water is required in the preparation of many formulæ for use in dental practice.

ARGENTI NITRAS—NITRATE OF SILVER.

LUNAR CAUSTIC.

Formula.—$AgNO_3$.

Derivation.—Nitrate of Silver is obtained by dissolving silver in nitric acid and distilled water, and evaporating the solution. It is in the form of heavy, colorless, anhydrous salt, and crystallizes in shining, rhombic plates. The action of light and organic matters cause it to turn black. It is wholly soluble in distilled water, the only preparation of water that should be employed in forming solutions of this salt. It has a strong, metallic, styptic taste. In the preparation of the solid form of sticks, it is first melted and poured into moulds, exposure to the light causing the sticks to become gray, and more or less dark, owing to the reduction of the silver by the sulphuretted hydrogen contained in the atmosphere; hence, on account of the decomposition of this salt, it should be carefully excluded from the light.

Medical Properties and Action.—Nitrate of silver is tonic, antispasmodic, sedative and astringent, but not irritant. The pure form when locally applied is a powerful caustic, very superficial in its effects, coagulating the albumen with which it comes in contact, and forming a protective coat to the tissues beneath. It is eliminated very slowly from the system. When applied to the skin, mucous membrane, or ulcers, it produces, at first, a white appearance, owing to its union with the coagulated albumen of the cuticle, but this gradually changes to a bluish-gray, purple, and finally, black color, on account of the partial reduction of the silver by the sulphuretted hydrogen. Small doses, administered for a long time, give a peculiar blue appearance to the skin. When internally administered, is has an astringent action on the mucous coats of the intestines. It is a powerful tonic to the nervous system, and has been chiefly employed as an antispasmodic tonic. It is chiefly used externally, as a stimulant, vesicant, and escharotic. If applied, even lightly, three or four times, to the moistened skin, it will cause vesication in a few hours. The blue appearance on the skin, when small doses are long continued, is said to be preceded by a peculiar blue line on the gums, like that from lead poisoning. A very minute quantity of this salt, when internally administered, is eliminated by the kidneys, as most of it escapes by the liver and the intestinal glands, a portion remaining permanently deposited in the tissues, when its use has been long continued. Six weeks is the length of time it is safe to continue its internal use, and during that time occasional purgatives should be given, to promote its elimination. The persistent use of iodide of potassium and the hyposulphite of soda will cause the absorption and excretion of the silver deposits, in cases of skin discoloration from its long-continued use, aided by baths of the hyposulphites, and the very careful use of lotions containing cyanide of potassium, which possesses a solvent power over silver deposits. As long as inflammation is present, it should not be internally administered, and during a course, it should be occasionally intermitted for a few days, and a purgative used. The gums and fauces should be frequently examined, and if the slightest blue discoloration is observed, the remedy should be discontinued. Exposure to the sun should be avoided.

Therapeutic Uses.—Nitrate of Silver is internally employed in

dyspepsia, chronic gastritis, chronic diarrhœa and dysentery, cholera, diseases of the eye, chorea, epilepsy, asthma and whooping-cough.

Externally in ophthalmia and other diseases of the eyes, cutaneous diseases, diphtheria, erysipelas, hydrophobia, enlargement of glands, diseases of the genito-urinary organs, diseases of the ear, burns, ulcers, hemorrhage, etc., etc.

Dose.—Of nitrate of silver, gr. 1/6, gradually increased to gr. 1/2 three times a day, in pill made of some vegetable powder, or in solution. The fused nitrate of silver—*Argenti Nitras Fusa*—or solid form, in pencils or sticks is used externally.

Dental Uses.—Nitrate of silver is one of the comparatively limited number of astringents applicable to mucous surfaces which are not irritant as well as astringent. For inflamed and ulcerated conditions of the mucous membrane of the mouth, nitrate of silver is a valuable application, in the form of injections or solutions of various strengths, from gr. ij to ℥ss of distilled water; also in diseases of the antrum and fistula, as an injection. It is also used as a styptic, for the arrest of alveolar hemorrhage, but is not so reliable as tannic acid, gallic acid, etc., on account of the coagulum or clot formed by it, being soluble in an excess of albumen. It is also employed to obtund the sensitiveness of dentine, especially where the cause is mechanical abrasion; also in aphthæ, mercurial stomatitis, ulceration of the gums, salivary fistula, alveolar abscess. For obtunding sensitive dentine, the stick form (one end of a stick inserted into a quill, or fused on the end of a platinum wire) is employed; or the end of a silver wire may be immersed in nitric acid, and applied to the sensitive surface, taking care to limit its action to the part on which it is to act. When applied to sensitive dentine, it acts on the gelatinous portion of the tooth, destroying its vitality to the extent of the combination which takes place. The objection to its use in such cases is the discoloration it causes, if permitted to reach the dentine; a weak solution of cyanide of potassium will remove its stain from linen.

Dr. C. N. Pierce recommends saturating blotting paper with a 40 per cent. solution of nitrate of silver for application to children's teeth, as it cauterizes the soft tissues and acts upon the hard in a satisfactory manner, without danger or staining the

fingers; asbestos paper or felt may also be saturated with the nitrate of silver for use in the mouth. Dr. Kirk recommends thin asbestos felt, as being better than paper. Before saturating the asbestos felt, it should be heated to redness over a Bunsen burner to burn out any organic matter with which it may be accidentally contaminated.

Dr. Black recommends nitrate of silver as useful in the treatment of caries of the teeth "under some certain conditions"; mostly in deciduous teeth, but occasionally in the permanent teeth also. His method is as follows: In the case of broad, shallow cavities in children's teeth, a full exposure of the decayed area as practicable, is made, and then the outer portion of the carious material only should be removed. Then the rubber dam is adjusted, the decayed area dried, and some pulverized nitrate of silver is laid upon the carious area, with just enough of water to dissolve it, and insure the saturation of the whole of the softened dentine. This should remain from five to fifteen minutes, the longer time if the patience of the child will allow, the surplus removed with absorbent cotton, and the cavity lightly washed with water and again dried. After such treatment the carious cavity should assume a deep black color within two or three days. In cavities so treated the progress of decay will generally be arrested either permanently, or for a considerable time.

Nitrate of Silver in a 10 per cent. solution is also recommended for incipient decay and hypersensitiveness about the necks of teeth, first removing the soft carious portion and polishing the prepared surface before applying the silver solution, which will not discolor the tooth structure when thus treated.

As salt decomposes the nitrate of silver, a solution of the chloride of sodium will relieve the excessive pain following its application to sensitive dentine, or to ulcers of the mouth; such a solution will also remove recent stains, if followed by the application of a solution of ammonia. Old stains may be removed with tincture of iodine, followed by cyanide of potassium. For the removal of the discoloration of the teeth by nitrate of silver, Dr. Geo. W. Cook recommends first an application of tincture of iodine, followed by ammonia.

A convenient way to keep ntitrate of silver ready for use is to soak asbestos fibre in a saturated solution, and allow it to dry.

The antidote in cases of poisoning by nitrate of silver is chloride of sodium (common salt), which converts it into chloride of silver, to be followed by emetics, and the proper antiphlogistic treatment. A solution of cyanide of potassium will also remove recent stains of nitrate of silver. (See Argyrol.)

Nargol.—Nucleide of Silver, contains 10 per cent. of silver, and is antiseptic, astringent, stimulant, and germicidal. It is less irritating than nitrate of silver, and is said to possess greater penetrating power for the reason that it does not coagulate albumins. It is used in the treatment of follicular ulcers of the gums, and in antral diseases in 25 per cent. solution.

Actol—Silver Lactate—is in the form of a white powder which is soluble in 20 parts of water; in 1:1000 it is an efficient germicide.

Citrate of Silver is in the form of a white powder sparingly soluble in water, and is a germicide in a solution of 1:4000. It is also employed as an ointment of 1 to 2 per cent. strength.

Protargol contains 8.3 per cent. of metallic silver, and is soluble in water. It is also germicidal and is less irritating than nitrate of silver; as a substitute for the nitrate it is employed in purulent stomatitis in solution of 1 to 5 per cent.

DENTAL FORMULÆ.

For Inflamed and Ulcerated Mucous Membrane.

℞ Argenti nitratis gr. ij to ʒss
Aquæ destillatæ . . . fʒj. M.
SIGNA.—To be used as a lotion.

For Diseases of the Antrum.

℞ Argenti nitratis . . gr. j to gr. v
Aquæ destillatæ . . fʒj. M.
SIGNA.—To be used as an injection.

For Ulcers and Aphthæ.

℞ Argenti nitratis . . . ʒss
Aquæ destillatæ . . . ʒj. M.
SIGNA.—To be applied with a camel's-hair brush.

For Mercurial Stomatitis.

℞ Argenti nitratis . . . gr. ss
Aquæ destillatæ . . . fʒj. M.
SIGNA.—To be used as a mouth wash.

ARGYROL. SILVER VITELLIN.

Derivation.—Argyrol is a soluble protein compound of metallic silver, freshly prepared solutions of which should be used in every case, and no stock solutions employed. It contains 30 per cent. of silver.

Medical Properties and Action.—Argyrol is free from irritating properties, solutions as strong as 20 per cent. causing no pain or discomfort. It promptly allays irritation and inflammation. In purulent processes it is preferable to silver nitrate applications which are painful and escharotic; argyrol causes no eschar. It has a powerful effect and bactericidal action on the septic surface of an ulcer, and it is claimed that no other silver salt can compare with argyrol in efficacy. As it is not absorbed its effects are topical; it is also non-toxic.

Therapeutic Uses.—Argyrol is a valuable topical agent in the treatment of chronic infiltrative conditions of mucous membranes, especially of the mouth, nose and throat; it is also employed in cystitis, tonsillitis, mucous colitis, membranous enteritis, gonorrhœa, diseases of the eye, such as conjunctivitis, ulcers of the cornea, ophthalmia neonatorum, trachoma, etc.; also in laryngitis, pharyngitis catarrh, hay fever, affections of the ear, inflamed hemorrhoids and ulceration of the rectum, diseases of the antrum, typhoid fever, etc. Argyrol should never be dissolved in anything but water, for use in the eye, etc.

Dose.—For internal administration in cases of dysentery, argyrol may be given in the form of capsules, one capsule containing 5 grains, followed by a glass of water and administered 2 to 3 times daily. For a topical application—10 to 50 per cent. solution.

Dental Uses.—In pyorrhœa alveolaris argyrol may be injected into the pus pockets in 25 to 50 per cent. aqueous solution with marked benefit; such an application to be made twice a week. In diseased conditions of the antrum a 10 per cent. solution is recommended, as it is unirritating, and has a marked effect in reducing pain and inflammation. With some it has entirely superseded the use of silver nitrate solution for all purposes for which the latter is used, such as inflamed and ulcerated conditions of the mucous membrane, to obtund sensitiveness of dentine, fungous growths, the various forms of stomatitis, abscess. Argyrol stains on the hands or on linen can be immediately removed by immersion in a 1 to 500 bichloride of mercury solution.

ARISTOL—DITHYMOL-DIIODIDE—DITHYMOL-BINIODIDE.

Formula.—$C_{26}H_{28}(OI)_2$.

Derivation.—Aristol is obtained by adding a solution of iodine in iodide of potassium, to an equal solution of hydrate of sodium, containing thymol. It is in the form of a red-brown, precipitated, amorphous, non-crystallizable powder. The proportion of iodine in aristol has been estimated at 46 per cent. Aristol it insoluble in water and glycerine, slightly soluble in alcohol, but readily soluble in chloroform, ether, and in the essential oils; but the solution must be made by friction without heat, as the aristol is decomposed by heat and also by the light. It possesses but a slight odor, like that of thymol, and is not unpleasant.

Medical Properties and Therapeutic Uses.—Aristol possesses no irritant action upon the unbroken skin, and when applied to mucous membrane it promotes absorption. Not being absorbed, it has no toxic effect, and for such reason, together with its freedom from disagreeable odor, it possesses a great advantage over iodoform. It produces rapid healing, and has been employed with benefit in varicose ulcers as a dusting powder; also in cutaneous diseases, gonorrhœa, gleet, in operations of anal fistula, abscess, lymphadenitis, periostitis, psoriasis, ulcers, etc., etc. It is chiefly employed as a dusting power, or in ethereal solutions or ointments, for epithelioma, burns and scalds. Aristol is considered to be an excellent and prompt antiseptic, but the name is merely an assumed one for dithymoldic iodine. Impurities in aristol would be all the by-products derived from unskillful treatment; it might contain potassium, or sodium iodide, or free iodine; it might be adulterated even, for, as a patented article, it is above control, as patents have been granted by the U. S. Patent Office for its control, manufacture and sale under the name of "aristol," being a compound of thymol with iodine. The virtue of aristol over iodoform, etc., has not as yet been so pronounced as to exclude it from the general class of patented medicines.

Dental Use.—Aristol has been used as a substitute for iodoform, iodol, carbolic acid, etc., etc., in all cases when the ordinary antiseptics are indicated, as in gangrenous pulps, antisepticizing of root-canals, disinfection of cavities before the introduction of

fillings, in the form of a 10 per cent. solution in sulphuric ether for disinfecting purposes; for gangrenous pulps, the aristol in powdered form may be applied with a small brush. Sticks made of cacao butter 10 parts, and aristol 1 part, may be used to promote granulation and healing. Aristol has the advantage of being effective in small quantities, and may be diluted with sugar of milk.

Dr. E. C. Kirk highly recommends aristol for alveolar pyorrhœa, a 10 per cent. solution being rubbed upon a glass plate with oil of cinnamon and introduced into each suppurating pocket and around the root at the base of each pocket, on threads of absorbent cotton saturated with the solution; the oil of gaultheria may be substituted for the oil of cinnamon if desired. Dr. Kirk and others also recommend aristol in the essential oils as a medicament for canal-dressings, and as a topical dressing in acute pulpitis. Dr. Kirk recommends that as a root-canal dressing, its use should be strictly confined to those cases where pericemental inflammation is not a present factor, as it does not possess antiseptic qualities sufficiently powerful to overcome quickly septic conditions due to the putrefactive changes common in root-canals. He also finds it extremely valuable in connection with gutta percha, as an antiseptic in conjunction with permanent root fillings—aristol with chloroform being used to dissolve the gutta percha. It is also recommended as an ingredient of nerve paste, being equal to iodoform for such a purpose, but free from the disagreeable odor of the latter substance; it is also used in chloroform solution, instead of sandarach varnish, for saturating cotton used for wedges or temporary fillings for retaining medicaments in cavities in the teeth; such a dressing or wedge may be retained for days or a week, and being antiseptic, it is free from disagreeable odor during that time. Aristol is also recommended as a dressing where approximal caries has extended beyond the gum margin, and where hypertrophy of the gum festoon occurs to the degree of forming a polypoid growth which invades the cavity; also in the form of a varnish it is combined with collodion as a pulp-capping material. To increase the adhesiveness of the aristol solution, a small quantity of Canada balsam may be added to it.

Dr. R. M. Chase recommends an aristol chloro-percha root

filling composed of two grains of aristol in one drachm of chloropercha.

DENTAL FORMULÆ.

For Alveolar Abscess and Necrosed Teeth.

DR. S. CLIPPINGER.

℞ Aristol . . . . . ℥j
Chloroformi . . . . ℥jss
Ol. Cassiæ . . . . . ♏x. M.

SIGNA.—Apply on cotton wrapped around a small broach.

For Ulcers, Burns, Eczema, etc.

DR. POTTER.

℞ Aristol . . . . . gr.v
Etheris . . . . . .
Alcoholis . . . . . āā℥ij
Saponis (soft) . . . ℥j. M.

SIGNA.—Use as a liniment.

Dissolve the aristol in the ether and alcohol and then incorporate the soap.

ARNICA.

LEOPARD'S BANE.

Source.—Arnica Montana is a perennial herbaceous plant of which the dried flowers and root—*Arnicæ Flores and Arnicæ Radix*—are the medicinal portions, and is found in the mountains of Northern Europe and the Northwestern portions of America.

Medical Properties and Action.—Arnica is nervine, stimulant, and diaphoretic. In over-doses it is an acro-narcotic poison, causing vomiting, purging, vertigo, tetanic twitching of the muscles, and convulsions. Moderate doses, when long continued, are liable to cause a very troublesome eruption. Its activity depends upon an alkaloid—*Arnicina*, which is a bitter and acrid extractive.

Therapeutic Uses.—Arnica is administered internally in typhus and typhoid fevers, chronic dysentery, rheumatic gout, etc., etc. Externally to bruises, sprains, lacerations, chilblains, etc., in the form of tincture—*Tinctura Arnica*. The antidote for poison by arnica is common vinegar.

Dose.—Of the extract of arnica, gr. v to gr. x. Of the tincture of arnica (arnica root, ℥j, rectified spirit Oj), the dose is ♏x to f℥ss.

Dental Uses.—In dental practice, the tincture of arnica is applied to irritable pulps of teeth, in periodontitis to prevent sup-

puration, to wounds of the mucous membrane of the mouth, combined with glycerine, to abraded surfaces caused by artificial teeth, and with tannic acid or glycerine of tannin for ulcers of the mouth.

The tincture of arnica, when largely diluted with water, forms an efficient mouth wash during operations upon the teeth. Equal parts of tincture of arnica and glycerine diluted with water form an effective mouth wash in inflammations of the mucous membrane of the mouth.

DENTAL FORMULÆ.

For Abraded Surfaces of the Mucous Membrane of the Mouth.

℞ Tincturæ arnicæ,
Glycerini . . . . . āāj℥. M.
SIGNA.—To be used as a lotion.

Astringent Mouth Wash in Alveolar Pyorrhœa, etc.

DR. J. R. BELL.

℞ Tincturæ arnicæ . . ℥j
Acidi Carbolici . . . ♏xx
Tincturæ myrrhæ . . ℥ss
Olei gaultheriæ . . . ℥jss
Alcoholis . . . . . ℥ijss. M.

For Ecchymosis.

℞ Tincturæ arnicæ . . . ℥ss
Liquor ammonii muriat. . . . . ℥ss
Aquæ . . . . . ℥v. M.
SIGNA.—To be used as a lotion.

For Inflamed and Ulcerated Mucous Membrane.

℞ Tincturæ arnicæ . . ℥ij
Glycerini . . . . . ℥ij
Aquæ rosæ . . . . ℥ij
Aquæ Destillatæ . . ℥x. M.
SIGNA.—To be used as a gargle.

ATROPINÆ SULPHAS—SULPHATE OF ATROPINE.

ATROPINE.

Formula.—$C_{17}H_{23}NO_3$.

Derivation.—Sulphate of Atropine is the alkaloid of Atropa Belladonna, and is obtained by adding a mixture of sulphuric acid to an ethereal solution of atropine. It is in the form of a white, slightly crystalline powder, very soluble in water and alcohol, but insoluble in ether. It is inodorous, and of a bitter taste.

Medical Properties and Action.—Sulphate of atropine is anodyne antisialagogue, and excito-motor, and has the same medical properties and action as belladonna, of which it is the alkaloid, but is far more energetic in its action. It is an active poison, and

should only be administered internally with the greatest care. Hypodermically employed, it is a useful anodyne and antispasmodic, and the quantity should be cautiously increased from a very small dose in the beginning. Such symptoms as dryness of the throat, vertigo, and diplopia, are indications that its use should be discontinued. Without being a direct hypnotic, it induces sleep by relieving pain. Although it is not so well tolerated, as a general rule, as is morphine, yet patients who cannot bear morphine will bear atropine.

Therapeutic Uses.—See Belladonna.

Dose.—Of sulphate of atropine, gr. 1/120 to gr. 1/60. For an anodyne and antispasmodic, hypodermically injected, the dose is ♏ij = gr. 1/120, as a commencement. An ointment is made of atropine gr. viij, rectified spirit f℥ss, lard ℥j.

The antidotes in cases of poisoning by Belladonna and its alkaloid are an infusion of galls and lime water, first evacuating the stomach as speedily as possible with emetics or stomach pump, or tannic acid, animal charcoal followed by emetic; later castor oil; artificial respiration and stimulants; opium, or pilocarpin hypodermically. The symptoms of Belladonna poisoning are dryness of mouth and pharynx, brightness of eyes, dilatation of pupils, spectral illusions, flushed face, hurried respiration, delirium, convulsions, stupor, coma.

Dental Uses.—In dental practice, sulphate of atropine is applied internally to obtund the sensitiveness of inflamed pulps of teeth, preparatory to their treatment, and to their devitalization; it is also applied to acute inflammations, depending upon alveolar periostitis and abscess. It forms one of the ingredients of a nerve paste, for devitalizing pulps of teeth, being substituted for the acetate of morphine, but there is doubt as to its being so effective as the morphine salts; in facial neuralgia, in the form of an ointment; in neuralgia and in profuse salivation. As an anodyne for internal use, it proves efficacious in relieving intense pain, such as may result from an inflamed pulp or periosteum; also internally, or in the form of hypodermic injections, for the relief of facial neuralgia; for such a purpose 1/120 of a grain of the atropine sulphate is often combined with morphine sulphate. For topical application, the standardized fluid extract of belladonna leaves, containing 0.35 per cent atropine, is suggested

DENTAL FORMULÆ.

For Facial Neuralgia.

℞ Atropinæ sulphat . . gr.j
Adipis . . . . . ʒj. M.
SIGNA.—To be applied in the form of an ointment, over seat of pain.

For Neuralgia.

J. L. LUDLOW.

℞ Atropinæ sulphatis . gr.ss
Aconitinæ . . . . . gr.iss
Olei tiglii . . . . . gtt.ij
Ung. petrolei . . . ʒij. M.
SIGNA.—Apply externally.

For Facial Neuralgia.

℞ Pulveris belladonnæ . gr.x
Camphoræ . . . . . ℥ss
Spiritus rectificati . . q.s. M.
SIGNA.—To be applied with a camel's-hair brush.

For Neuralgia of Superficial Nerves.

AITKEN.

℞ Atropinæ sulphat . . gr. v
Aquæ destillat. . . . fʒiii. M.
SIGNA.—Use on a compress and renew several times in 24 hours, and continue for at least one hour at a time, covering with oilskin, to prevent evaporation.

For Facial Neuralgia.

℞ Ext. belladonnæ . . gr.ss
Quininæ sulphat. . . gr.ij. M.
Ft. pil. No. 1.
SIGNA.—Use 3 times daily.

For Facial Neuralgia.

℞ Linimenti belladonnæ,
Linimenti aconiti . . ää ʒvij
Chloroformi . . . . fʒij. M.
SIGNA.—To be applied as a lotion, on lint saturated with it, and covered with oiled silk.

For Neuralgia in Superficial Nerves.

℞ Chloroformi,
Spts. vini rect. . . . ää ʒss
Atropinæ sulphat. . . gr.v. M.
SIGNA.—To be applied on lint to painful part, and covered with oiled silk.

For Neuralgia.

℞ Ext. belladonnæ . . . . . gr.iv
Ext. stramonii . . . . . gr.v
Ext. hyoscyami . . . . . gr.v.
Quininæ sulphat. . . . . ℈ij. M.
Ft. pil. No. xx.
SIGNA.—One pill 2 or 3 times a day.

AURUM TERCHLORIDUM—TERCHLORIDE OF GOLD.

Formula.—$AuCl_3$.

Derivation.—The Terchloride of Gold is obtained by dissolving gold in *aqua regia* (three parts, by measure of hydrochloric acid, and one of nitric acid), using gentle heat to hasten the solution, the acids employed being chemically pure. The solution is then evaporated to dryness, when ruby-red prismatic crystals of the terchloride of gold result.

Properties and Action.—Terchloride of gold is very deliquescent, and is soluble in water, alcohol and ether. It possesses a disagreeable, styptic taste, reddens blue litmus paper, and will impart a purple stain to the skin, which may be removed by a solution of cyanide of potassium. It is readily decomposed by many metallic and non-metallic elements, and also by saline and organic compounds, on account of its elements being held together by a feeble affinity. It is escharotic and disinfectant, and its physiological effects are similar to those of corrosive sublimate. It is not used internally.

Dental Uses.—In dental practice, the terchloride of gold, in the form of an aqueous, alcoholic, or ethereal solution, is employed for the purpose of obtunding the sensitiveness of dentine, for which it is a valuable application; and the ethereal solution possesses some advantages over the aqueous or alcoholic solutions for such a purpose. To prepare an obtunding solution: "Dissolve the crystals of the gold in pure water; fill a test-tube half full of the solution, then add an equal quantity of sulphuric ether, and agitate the mixture. Let it then rest for a few minutes, when the ethereal solution will rise to the surface, and may be poured off into another tube or phial, and securely stoppered. It should be kept, as much as practicable, from the action of light and air. Applied to dentine, on pledgets of cotton, it acts like chloride of zinc, but more promptly and with less pain. Chlorine is more abundantly liberated during its action than from chloride of zinc; hence it is a better disinfectant than the latter. It has a fine yellow tint, and it is not absorbed by the dentine, but forms an insoluble compound with the gelatinous elements. As it is an irritant poison, care should be observed in its use. If not protected in a glass-stoppered bottle, the gold is precipitated in a metallic form.

BELLADONNÆ FOLIA—BELLADONNA LEAVES.
BELLADONNÆ RADIX—BELLADONNA ROOT.

DEADLY NIGHTSHADE.

Source.—Belladonna is a perennial, herbaceous plant, found in Europe, the leaves and root being the medicinal portions.

Medical Properties and Action.—Belladonna is anodyne and an-

tispasmodic, its activity depending upon an alkaloid, *Atropine*. Belladonna, in small doses, is a valuable narcotic and anodyne stimulant. It causes a peculiar dryness of the mouth, fauces, stomach and intestines, but increased secretion follows, especially in the case of the latter organs, when atropine is administered or subcutaneously injected. In larger doses, it causes dilatation of the pupils, giddiness, loss of vision, difficult deglutition, constriction of the throat, difficult articulation, increased action of the heart, quickened respiration, nausea, vomiting, diuresis, purging, and sometimes a red eruption. It is eliminated chiefly by the urine.

Opium is the antidote, or hypodermic injections of morphine. When applied to the eyebrows, belladonna causes dilatation of the pupils.

Therapeutic Uses.—Belladonna is extensively employed, either alone or in combination with sulphate of quinia, in the treatment of neuralgia; also in mania, Bright's disease, epilepsy, lead colic, spasmodic affections, diseases of the cerebro-spinal system, as a preventive of scarlatina, night sweats of phthisis, etc.

Dose.—Of powdered belladonna, gr. ss to gr. j, daily; of the extract, gr. 1/4 to gr. j; of the tincture, gtt. v to gtt. xx. Belladonna should not be given immediately before or after meals, as it decreases the gastric fluids. (See Atropine.)

BISMUTH SUBNITRAS—SUBNITRATE OF BISMUTH.

Formula.—$BiONO_3 + H_2O$.

Derivation—The metal Bismuth—*Bismuthum*, *Formula* Bi, from which the subnitrate is obtained, is found native in Europe and America, and generally in combination with sulphur and oxygen. It fuses at 510° F., and is brittle and pulverizable. It is employed in the dental laboratory for making fusible metal alloys for dies and counter-dies.

The Subnitrate of Bismuth is obtained by dissolving the metal bismuth in dilute nitric acid, and converting the nitrate thus formed into carbonate, by adding a solution of carbonate of sodium, which is then dissolved in nitric acid and the nitrate of bismuth again formed, which is washed in water and the nitric acid removed by ammonia. Such a process frees it from the

arsenious acid which metallic bismuth generally contains. Subnitrate of bismuth is in the form of a heavy, white powder, with a faint acid odor and slight metallic taste, and is soluble in water. Large quantities are poisonous, with symptoms of arsenical poisoning.

Medical Properties and Action.—Subnitrate of bismuth is sedative, astringent and alterative. Owing to the formation of a sulphide, it coats the tongue black, and its continued use may give rise to the formation of a bluish-red line on the gums, similar to that resulting from the use of lead, except that the line is wider and deeper in color. In proper doses, it promotes the appetite and increases the digestive power. Being somewhat astringent, it affects the intestinal movements, and can be detected in the blood, urine, and other secretions.

Therapeutic Uses.—Subnitrate of bismuth is employed in atonic dyspepsia, gastric irritations (milder forms), pyrosis, gastrodynia, ulcer of the stomach, diarrhœa from debility, etc., chronic laryngitis, epilepsy, ringworm (in form of an ointment ℥j to lard ℥j), chronic skin diseases, chlorosis, when iron is not tolerated, etc., etc. If not well borne by the stomach, it may be combined with aromatic powder, or if alkalies are indicated, with chalk and magnesia.

Bismuthi subnitras is also employed as an antiseptic dressing for wounds, to promote primary union. The subnitrate is held in suspension in water, in the proportion of 10 per cent., and during the operation the wound is, from time to time, sprinkled with the solution, and afterward sealed with a bismuth paste, and the subsequent dressings made in the same manner.

Dose.—Of subnitrate of bismuth, grs. v–x to ℥j, in powder or emulsion.

Dental Uses.—Subnitrate of bismuth is a valuable internal remedy in aphthæ, mercurial salivation, painful ulcers of the mucous membrane of the mouth, vomiting, cholera infantum, and diarrhœa of children during painful dentition. It is best given in milk, and before meals.

For cancrum oris, after using a disinfecting solution to cleanse the gangrenous part, the topical application of subnitrate of bismuth, every three hours, corrects the fetor, arrests the progress of the gangrene, and hastens cicatrization.

DENTAL FORMULÆ.

For Vomiting and Painful Digestion of Teething Children, Acidity and Pyrosis.

BARTHOLOW.

℞ Bismuthi subnitrat. . ℥iij
Acid carbol. . . . . gr.ij–gr.iv
Mucil. acaciæ. . . . ℥j
Aquæ menthæ pip. . ℥iij. M.

SIGNA.—A tablespoonful for adults and proportionate quantity for children, 3 or 4 times a day.

For Gangrene of Mouth (Cancrum Oris).

℞ Bismuthi subnitras (powd.)

SIGNA.—Applied to ulcerated surface, and covered with absorbent cotton.

For Diarrhœa of Dentition.

℞ Bismuthi subnitrat. . gr. lx
Extract rhei fluid . . gtt.viij
Syrup rubus . . . . f℥ss
Elixir aurantii . . . f℥ss. M.

SIGNA.—A teaspoonful 4 to 6 times a day. Proper feeding—barley water, milk and lime water. Starchy food prohibited.

For Indigestion, Cholera Infantum, Vomiting and Diarrhœa, Disordered Digestion.

℞ Bismuthi subnitrat., grs. iij to vj for children, every hour, or grs. v to x or xv for adults.

Dermatol is a basic gallate of bismuth in the form of a fine saffron-yellow powder, odorless and innocuous. It is insoluble in water, alcohol, and ether; not hydroscopic, or otherwise affected by air or light. It resembles iodoform in appearance, and possesses astringent, antiseptic and desiccant properties. It is used externally in wounds, ulcers, and inflammations of mucous membranes, and is of especial value in lesions, attended by profuse secretion, as eczema, burns, ulcers, wounds, and diseases of the eye and ear. Internally, it is employed in diarrhœa, etc. As an antiseptic it prevents putrefaction, and also the development of bacteria when used as a 1.10 per cent. solution. Dermatol may be used as a powder, as liquid and paste, in emulsion of collodion, glycerine, and essential oils, and as an ointment with lanolin wax, oxide of zinc, and paraffin.

BROMIDES.

Bromides are diffusible agents which rapidly pass into the blood, and in large doses can be detected in the fæces and intestinal mucus, owing to a portion of the agent not being absorbed. They depress the heart's action, and also respiration and animal temperature; in some cases large doses may cause transient ex-

citement, giddiness and intoxication. Moderate doses have a tranquillizing effect and refreshing sleep, and lower the sensibility to pain and irritation. Bromides are employed to allay any conditions attended with cerebral or nervous excitement as headache, hysteria, epilepsy, convulsions, etc. Their immoderate or prolonged use will cause paralysis of the muscles, and a condition known as *bromism*, the symptoms of which may be extreme pallor and anemia, dilated pupils, slow and feeble action of the heart, breathlessness and quickened pulse on slight exertion, acne, skin eruption, cool extremities, tremulous and uncertain movements, want of tactile feeling, relaxation of the genitals, dry fauces, difficult deglutition, and weak mind.

Ammonii Bromidum—Bromide of Ammonium. Formula.—NH_4Br. In the form of colorless, transparent crystals, or a white granular salt, with a pungent, saline taste, neutral reaction, and no odor. Ammonii Bromidum is soluble in 1.5 parts of water, in 150 parts of alcohol at 60° F., and in 0.7 part of boiling water.

Dose.—Gr. x to ℥ss, considerably diluted.

Calcii Bromidum—Bromide of Calcium. Formula.—$CaBr_2$. In the form of a white granular, deliquescent salt, with a pungent, saline, bitter taste, and no odor. It has a neutral reaction, and is soluble in 0.7 part of water, and in 1 part of alcohol.

Dose.—℈j to ℥ij.

Lithii Bromidum—Bromide of Lithium. Formula.—LBr. In the form of white, granular, deliquescent salt, with a pungent, bitter taste, and a neutral reaction. Quite soluble in water and alcohol.

Dose.—Gr. v to ℈ij.

Sodii Bromidum—Bromide of Sodium. Formula.—NaBr. In the form of small colorless crystals, or a white crystalline powder, with a saline taste, neutral reaction and no odor. It is soluble in 1.6 parts of water, and in 200 parts of water at 60° F.

Dose.—℈j to ℥ii. (See Bromides of Potassium, Camphor and Ethyl.)

Medical Properties and Therapeutic Uses.—The bromides have the same general action and are employed for the same purposes. The bromide of lithium is considered to have a more hypnotic influence than the others; and the bromide of sodium is generally

given in full doses; the others in rather smaller doses. Prof. Bartholow considers the bromide of potassium to possess more toxic power, and the bromide of sodium the least. As regards their influence on the pulse, body, head and respiration, the same author places the bromides in the following order; bromide of sodium, bromide of lithium, bromide of potassium, bromide of ammonium. The bromides are eliminated through the kidneys chiefly; also through the mucous membrane of fauces, bronchi, intestinal canal and the skin; several days being required for their diffusion outwardly from the blood. The bromides are administered in delirium tremens, insanity, increased action of the heart, tetanus, neuralgia, epilepsy, vaso-motor disturbances, spasmodic asthma, abnormal sexual excitement, nocturnal seminal emissions, vomiting of cerebral congestion, pregnancy and sea-sickness, chlorea infantum, migraine, strychnine-poisoning, etc., etc. Locally in pruritis, prurigo, eczema, epithelioma, old ulcers, etc. (For Dental Uses, see Bromide of Potassium).

BROMOL.—TRI-BROM-PHENOL, BROMO-PHENOL.

Formula.—$C_6H_2Br_3HO$.

Derivation.—Bromol is a compound of bromide and carbolic acid. It is in the form of soft, white needles, and is prepared by treating phenol or carbolic acid with an excess of bromine in aqueous solution.

Medical Properties and Therapeutic Uses.—Bromol possesses strong antiseptic properties, and at the same time is non-toxic. Rademaker recommends it for external use, either dissolved in olive oil (1 in 30) or mixed with vaseline (4 in 40). It may also be employed in the form of powder like iodoform, for sprinkling in wounds.

It is also used internally in cholera infantum, typhoid fever, etc., etc.

Dose.—For internal administration, the dose of bromol is from 1/4 to 1/ 2 grain.

Dental Uses.—The uses of bromol in dental practice are the same as iodol, iodoform and other antiseptics. Good results have been obtained by its application to teeth affected with alveolar abscess and gangrenous pulps.

CAFFEINE—CAFFEINA.

Derivation.—Caffeine is a proximate principle of feebly alkaloid power, generally prepared from the dried leaves of Camellia Thea, or from the dried seeds of Caffea Arabica. Caffeine was first extracted from coffee. One cup of good, well-made coffee contains one-half to one drachm of the empyreumatic oil, which has no physiological effects. It is in the form of colorless, silky, inodorless crystals, sparing soluble in alcohol, and in 75 parts of cold water, but much more soluble in 9.5 parts of boiling water.

Medical Properties and Physiological Action.—It is a rapidly acting stimulent on the nervous system, its chief influence being on the brain and spinal column. By stimulating the muscles of the heart, it is supposed to increase the pulse rate and blood-pressure. It has a decided diuretic action, and counteracts the effects of narcotic remedies—it is valuable in opium poisoning, but is not a complete antidote. When taken into the stomach, it diffuses readily into the blood, and is eliminated principally by the kidneys and liver. Small doses increase the appetite, increasing peristalsis, and in some cases causing venous congestion and hemorrhoids. It also acts as a powerful stimulant to the respiratory centre.

Therapeutic Uses.—Caffeine is employed in neuralgia, migraine, hemicrania, dropsy, cholera infantum, asthma, cardiac disease, being a valuable cardiac stimulant. It often, however, produces insomnia to such a degree in cardiac disease, that its use has to be discontinued; if not, delirium, like that of alcohol, may ensue. The habitual use of coffee in some cases may also cause insomnia, palpitation, tremors, tinnitus aurium, gastralgia and emaciation. Caffeina alone cannot be used hypodermically owing to its decomposition in the presence of water; it is soluble in not less than 25 parts of water. The citrated caffeine is a clear, syrupy liquid with about 3 parts of water and upon dilution with water yields the white precipitate caffeine. The simple form of caffeine is soluble in 80 parts of water, and in 33 parts of alcohol.

Dose.—Of Caffeine, gr. ij to gr. v: of Citrate of Caffeine gr. ij to gr. v.

Dental Uses.—Caffeine is useful in facial neuralgia, migraine, hemicrania. For headache from nervous strain, caffeine com-

bined with antipyrin and one of the bromides is a useful and efficient remedy.

DENTAL FORMULÆ.

For Facial Neuralgia, Migraine, etc.

℞ Caffeinæ . . . . . gr.xx
Phenacetin . . . .
Pulv. aromatic . . . āā ℥ss. M.
SIGNA.—A powder every 2 or 3 hours.

For Facial Neuralgia, etc.

℞ Caffeinæ Citrat. . . . ℥ss
Ammonii bromidi . . ℥iij
Elix. guaranæ . . . f℥ij. M.
SIGNA.—A teaspoonful every hour or two until pain is relieved.

CALENDULA.

MARIGOLD.

Source.—Calendula is a well-known garden plant, sometimes growing wild, with a peculiar and rather disagreeable odor, and a bitter, rough, saline taste. Both the leaves and the flowers are employed.

Medical Properties and Action.—It is slightly stimulant, diaphoretic, antispasmodic, sudorific, and emmenagogue, but is seldom used internally. It contains a bitter principle known as *calendulin.*

Therapeutic Uses.—Calendula has been employed in low forms of fevers, scrofula, jaundice, amenorrhea, etc. Externally it is used in the form of tincture—*Tinctura Calendula*—in its full strength or diluted, and is very serviceable in exercising a curative influence in the treatment of incised wounds and contusions, preventing inflammation and suppuration. Some writers consider it to be unequaled as a local application after surgical operations, as it promotes union by first intention. It is applied as a lotion on lint. It is also thought to be a preventive against gangrene and tetanus.

Dose.—Of the tinctura of calendula, f℥j to f℥ij.

Dental Uses.—Calendula, in the form of tincture, is employed in dental practice as an application to wounded or irritated pulps of teeth, when wholly or partially exposed; also after the extraction of teeth; wounds about the mouth; and in such cases it proves a very useful remedy. A few drops added to a wineglass of water form a soothing and efficient mouth-wash for the soreness resulting from the removal of salivary calculus: also

useful in superficial inflammations of the mucous membrane of the mouth, etc.

CALX—CALCIUM.

LIME.

Formula.—CaO.

Derivation.—Lime is obtained by calcining limestone or chalk, until the carbonic acid is driven off. Lime is more soluble in cold than in hot water, and a compound of lime and sugar is more soluble in water than pure lime alone. Calcium is the metallic base of lime.

Medical Properties and Action.—Quicklime is a powerful escharotic and irritant.

LIQUOR CALCIS—*Lime Water.*—It is prepared by adding cold water to freshly slacked lime, and the clear fluid poured off.

The officinal preparation consists of forty troy ounces of saturated solution of lime in eight pints of distilled water. It is a colorless, inodorous liquid, possessing a disagreeable alkaline taste.

Exposure to the air causes it to gradually absorb carbonic acid, with the formation of insoluble carbonate of lime, and it should therefore be preserved in glass-stoppered bottles. The addition of liquorice or coriander seed will disguise its taste.

Medical Properties and Action.—Lime water is antacid, astringent, antiseptic and detergent. It is applicable to all cases where antacids are indicated, and where an astringent effect is not objectionable.

Therapeutic Uses.—Lime water is an excellent remedy in gastric irritation, accompanied with nausea and vomiting; also in dyspepsia, attended with vomiting of food; also in diarrhœa, after the inflammatory action has been relieved; also in glandular affections, as an alterative resolvent. Externally, as a wash for foul ulcers, diseases of the skin, and as an injection in gleet and leucorrhœa. Atomized inhalations have been found useful in diphtheria and membranous croup.

Dose.—Of lime water, f℥ss to f℥iij or iv, several times a day. It may be mixed with an equal quantity of milk for internal use.

LIME LINIMENT.—*Linimentum Calcis* (lime water f℥viij, flax

seed oil ℥vij) is a valuable application to burns, scalds and in smallpox.

Dental Uses.—In dental practice lime water is a useful agent in the form of a gargle, where the secretions of the mouth are viscid and fetid, and especially where the teeth are soft in structure and exceedingly sensitive, owing to the condition of the oral fluids, and especially in acrid mucous secretions, which act readily on teeth deficient in earthy constituents. For young patients, the use of lime water is very beneficial to the teeth, owing to an acid condition of the oral fluids, common to an early period of life. It is also useful where the teeth are very sensitive, on account of the recession of the gum and absorption of the process.

When lime water is applied to inflamed mucous membrane, or to suppurating surfaces, it arrests secretion. It is also useful in sickness and irritability of the stomach during dentition; also to relieve the superficial ulceration of the mucous membrane of the mouth, caused by the acid eructations attending dyspepsia, in the proportion of one part of lime water to two or three of milk.

Syrup of the Lacto-phosphate of Lime—*Syrupus Calcii Lacto-phosphatis*—is composed of precipitated phosphate of calcium, 22 parts; lactic acid, 33 parts; orange-flower water, 80 parts; sugar, 600 parts; hydrochloric acid, water of ammonia and water, each, a sufficient quantity.

Dose.—f℥j to f℥j.

This syrup is especially useful in rickets, mollities ossium, delayed union of fractures, caries and necrosis in bone, anemia of nursing mothers, mammary abscesses or boils, carbuncles, chronic bronchitis, leucorrhœa, early decay in the teeth in children, etc.

CALX CHLORATA—CHLORINATED LIME.

CHLORIDE OF LIME.

Formula.—$CaCl_2O$.

Derivation.—Chloride of Lime is obtained by passing chlorine over hydrate of lime till saturation is effected. It is in the form of a grayish-white substance, either in powder or friable masses, dry or but slightly moist. It is readily soluble in water,

and will absorb moisture when exposed to the air. It has a bitter, caustic taste, and a slight odor of chlorine. Chlorinated lime contains 35 per cent. of chlorine.

Medical Properties and Action.—Chloride of lime is a stimulant, deodorizer, disinfectant, antiseptic and bleaching agent. In small doses it increases the action of the secreting organs, and if long continued it acts specifically upon the lymphatic glandular system, causing the reduction or absorption of glandular and other tumors, In large doses it acts as an acro-narcotic poison, and its use should always be commenced in small doses, carefully increased, and discontinued when such symptoms as nausea, vomiting or giddiness appear. It is chiefly used as a disinfectant.

Therapeutic Uses.—Solutions of chlorinated lime are employed locally in scarlet fever, diphtheria, aphthæ, gangrene; and it has been administered internally in scrofula, typhus, malignant scarlet fever, syphilis, etc.

Dose.—Of chloride of lime, gr. j to gr v, in solution, several times a day. As a wash, 1 part dissolved in 100 parts of water.

Dental Uses.—Chloride of lime is employed in dental practice in the treatment of cancrum oris; one method of application being the introduction of the powder, with the point of the finger, to the ulcerated surfaces, and the mouth well washed out immediately afterward; also, in the form of a gargle composed of 1 part of powdered chloride of lime to 30 parts of mucilage and 15 parts of syrup. Solutions of chloride of lime are also efficient in scorbutic and other ulcerations of the mouth. It is also employed to correct the fetor of the breath, in the form of a mouth wash, prepared as a weak solution.

One of its most important uses in dental practice is as a bleaching agent, either alone or in combination with other substances, to restore the color of devitalized teeth. When chlorinated lime is employed for bleaching discolored teeth, a good quality should be obtained, and no steel instrument used for its introduction; wood or gold instruments are to be preferred, and the chloride should be perfectly dry, and have been kept so from the time it was made. An efficient bleaching preparation is composed of equal parts of dry chlorinated lime and tartaric acid, mixing them together dry, and adding a little of the acid at a time. When prepared, the mixture should be kept in a glass-

stoppered bottle. For bleaching purposes, chlorinated lime is also combined with chloroform, in the form of a thin paste. When chlorinated lime, or its combinations, is introduced into the cavity of a tooth, it should be secured by a temporary filling of gutta percha, Hill's Stopping, or one of the zinc preparations, and be secured from passing beyond the foramen of the root, by a filling introduced near the apex of the root. More than one application may be required, after which the cavity should be thoroughly cleansed, and a temporary filling of the whitest shade of the oxychloride of zinc filling material be introduced and worn for some time, after which a more durable gold filling can be inserted.

DENTAL FORMULÆ.

For Gangrene of the Mouth—Cancrum Oris.

BARTHOLOW.

℞ Calc. chlorat. . . . . ℥ss
Mucilaginis . . . . . ℥ss
Aquæ destil. . . . . ℥iiiss. M.
SIGNA.—To be used as a lotion.

For Fetor of the Breath.

BARTHOLOW.

℞ Cal. chlorat . . . . . ℥iij
Aquæ destil . . . . . ℥ij
Alcoholis . . . . . ℥ij
Ol. rosæ . . . . . gtt.iv. M.
SIGNA.—A teaspoonful in a tumblerful of water used as a gargle.

CAMPHO—PHENIQUE.

Formula.—$C_8H_{11}O$.

Derivation.—A limpid, volatile fluid with a hot, aromatic taste, and the odor of camphor, obtained from the chemical union of carbolic acid and camphor. Dissolve 9 parts of the acid in one part of alcohol and mix with 25 parts of camphor, forming a clear oily solution. Campho-phenique can be prepared by heating carbolic acid and pouring it into a bottle containing camphorgum.

Medical Properties and Therapeutic Uses.—Campho-phenique is an antiseptic, local anæsthetic, germicide and parasiticide. It is also non-irritant, non-poisonous, insoluble in water or glycerine, does not discolor or stain, and possesses an agreeable odor and taste. It prevents suppuration in fresh wounds, controls it in wounds in all stages, and as a local anæsthetic obtunds pain. It

is claimed that campho-phenique, pure, is equal to 1 to 85 of bichloride of mercury which is six times as strong as it can be used even on the unbroken skin, and about 25 times as strong as is considered safe on cut surfaces. Campho-phenique is altogether free from toxic or caustic properties, and is one of the safest of germicides; it also maintains an unchanged integrity and is well adapted to a large proportion of pathological dental cases. It should never be combined with water or glycerin, but it will mix in all proportions with alcohol, ether, chloroform, and all fatty substances.

Employed as an antiseptic, it penetrates the tissues as rapidly as carbolic acid, and also slightly hardens them.

Dental Uses.—As a pulp-canal dressing, campho-phenique has given very satisfactory results as a substitute for corrosive sublimate, carbolic acid, creasote, oil of cloves, iodoform, etc. If thoroughly applied to the gum or injected with a hypodermic syringe, it acts as an efficient local anæsthetic, and causes no constitutional disturbance. It is also employed as an obtunder of sensitive dentine, and relieves the pain following the extraction of abscessed teeth when applied on a pledget of cotton: it also relieves the pain attending the separation of teeth, and irritation of the dental pulp. It is also used as the menstruum for the arsenic and morphia of pulp devitalizing preparations: also for putrescent pulps, and as an antiphlogistic in the earlier stages of periodontitis. It will mitigate the pain attending the induction of suppuration, and either in full strength or diluted, give satisfactory results when injected into fistulæ. It is also useful as an antiphlogistic in the earlier stages of sthenic pericementitis applied to the gum on small pads of linen and renewed. Also useful in eczema, intolerable itchings, burns, sprains, etc.

DENTAL FORMULÆ.

For Chapped Hands.

J. W. Downey, M. D.

℞ Campho-phenique . . āā ℥j
Oil of Amygd. Amaræ ♏iij
Rose cosmolene . . . ℥j. M.
Signa.—Apply frequently.

Campho-phenique Dentifrice.

℞ Campho-phenique . . 4 parts
Myrrh . . . . . 2 parts
Cuttle-fish bone . . . 4 parts
Prepared chalk . . . 16 parts
Lake or rose pink . . 1 part

CAMPHORA—CAMPHOR.

Formula.—$C_{10}H_{16}O$.

Source.—Camphor is a concentrated substance obtained from the camphor laurel, an evergreen tree of China, Japan and Formosa, by sublimation, the crude gum being purified by resublimation with quicklime. As the solid constituent of the volatile oil, camphor may be derived from *cinnamomum camphora*. Refined camphor is in the form of large circular cakes, one or two inches thick, and has a strong, penetrating, fragrant odor, and a bitter, pungent taste, attended with a slight sense of coolness. It is white, pellucid, and somewhat unctuous to the touch. Camphor is soluble in alcohol, chloroform, ether, and oils, but sparingly soluble in water.

Medical Properties and Action.—Camphor is anodyne, stimulant, refrigerant, diuretic and diaphoretic. It increases the action of the heart and arteries, and renders the pulse softer and fuller; but such effects are very transitory, and are followed by depression. In large, but not over-doses, it allays pain and spasm, and induces sleep. In over-doses, it excites narcotic symptoms, with those of an irritant poison, and has proved fatal. It acts chiefly on the nervous system. Spirit of camphor is inhaled in syncope and headache.

Therapeutic Uses.—Camphor is administered in fevers of an asthenic type, acute inflammations, inflammation of the brain, delirium tremens, asthma, rheumatic and nervous headaches, diseases of the heart, hysteria, dysentery, diarrhœa, cholera, etc., etc. Externally as an anodyne in rheumatism, and as a discutient in chronic inflammatory affections; also, the powder as a snuff in coryza and influenza, and in the form of CAMPHOR LINIMENT—*Linimentum Camphoræ*—(camphor 1 part, olive oil 4 parts).

CAMPHOR WATER—*Aqua Camphoræ*—(camphor gr. cxx, alcohol ♏xl, carbonate of magnesia ℥ss, distilled water Oij).

SOAP LINIMENT—*Linimentum Saponis*—(camphor ℥iv, oil of rosemary f℥ss, alcohol Oij, water ℥vj) is an anodyne and gentle rubefacient for sprains, rheumatic and gouty pains.

SPIRIT OF CAMPHOR—*Spiritus Camphoræ*—(camphor ℥iv, alcohol Oij).

Dose.—Of camphor in substance, gr. ij to gr. x, in form of an

emulsion, made of sugar, gum arabic, myrrh and water. Of camphor water ℥j to ℥j; of spirit of camphor, ♏v to ♏xx.

Dental Uses.—In dental practice, the spirit of camphor is locally employed to allay the pain arising from the near exposure of the pulps of teeth; also the pain of sensitive dentine, and that following the extraction of teeth affected with periodontitis; also to arrest the hemorrhage and allay the pain of wounded pulps of teeth. It forms an efficient anodyne when in the form of a strong solution of camphor in chloroform. Camphor has also been employed in the treatment of putrescent pulps of teeth.

Combined with creasote or carbolic acid, camphor is thought to have the power of modifying the escharotic action of these agents. For such a purpose, 20 grains of camphor are combined with 1 ounce of the creasote or carbolic acid.

The Oil of Camphor.—*Oleum Menthæ Piperitæ* is preferred by some to answer such indications. Camphor also forms one of the ingredients of the celluloid base of artificial teeth, which is composed of pyroxylin 100 parts, camphor 40 parts, oxide of zinc 2 parts, and vermilion 0.6 part. With ether, camphor is also used as a local anæsthetic. A cataplasm of camphor, morphia and flaxseed, applied to the cheek, has been used for the relief of odontalgia.

Spirit of Camphor contains 10 per cent. of camphor in solution in alcohol.

Phenol-Camphor is made by mixing together 1 part of carbolic acid and 3 parts of camphor. After 24 hours this becomes a liquid, having a specific gravity of 990. It is used with oil as an antiseptic, and in the form of spray may be applied to the skin as a local anæsthetic. It is also employed to disinfect or sterilize surgical and dental instruments, and on wool and gauze for dressing wounds. It is soluble in ether, alcohol and oils, but insoluble in water or glycerin. Menthol, cocaine, salicylic acid, iodoform, chloral hydrate and mercuric chloride are soluble in phenol-camphor. (See *Campho—Phenique.*)

Camphoid is composed of camphor 20 parts, alcohol 20 parts, and pyroxylin 1 part.

Carbolated Camphor is composed of carbolic acid (crystal) 49 1/2 parts and gum camphor 50 1/2 parts.

Nausea from Impression Taking.—Dr. A. W. McCandless rec-

ommends a gargle of camphor water. Should this fail, a four per cent. solution of cocaine painted over surface of the tongue and palate will produce the desired result except in very obstinate cases; or a lozenge composed of one-fourth grain of cocaine allowed to dissolve in the mouth and swallowed before taking the impression.

DENTAL FORMULÆ.

For a Local Anæsthetic.

℞ Pulv. camphoræ . . ℥viij
Æther sulph. . . . . f℥j. M.
SIGNA.—Applied to the gum over the tooth to be removed, until it turns white or becomes blanched.

For a Local Anæsthetic.

℞ Chloral,
Camphoræ . . . . . āā℥j
Morphiæ sulph. . . . ℥ss
Chloroformi . . . . ℥j. M.
SIGNA.—Apply with a camel's-hair brush, allow to dry and re-apply as freely as is necessary to render part insensible to pain.

For a Stimulant and Anodyne Lotion.

℞ Spiritus Rosmarini . ℥j
Camphoræ . . . . . ℥j
Saponis albæ . . . . ℥iv. M.
SIGNA.—To be applied as a lotion.

For a Local Anæsthetic.

℞ Camphoræ . . . . . ℥j
Æther vel chloroformi ℥ij. M.
SIGNA.—Apply with a camel's-hair brush.

For Neuralgia.

℞ Camphoræ,
Chlor. hydratis āā equal parts. M.
SIGNA.—Apply as a lotion.

For Neuralgia and Exposed Pulps.

℞ Camphoræ . . . . . 5 parts
Chlor. hydratis . . . 2 parts
Cocaine hydrochlor. . 1 part. M.
SIGNA.—Heat to boiling point of water, when it liquefies; use as a local application.

For Pain of Tooth Extraction.

℞ Camphoræ . . . . . ℥j
Chloroformi . . . . f℥ij. M.
SIGNA.—Apply on cotton.

For Odontalgia.

℞ Camphoræ,
Chloral hydrat. . . . . āā gr. 75
Cocaine hydrochlorat . . . . . gr. xv. M.
SIGNA.—Place a small quantity on cotton within the tooth cavity.

CAMPHORA MONOBROMATA—MONOBROMATED CAMPHOR.

Formula—$C_{10}H_{15}BrO_2$.

Derivation.—Monobromated camphor is obtained by the action of bromine on camphor, and subsequent purification with animal charcoal and repeated crystallization. It is a colorless, crystal-

line substance, with the odor of camphor and turpentine, and a slightly bitter taste. It is insoluble in water, but soluble in alcohol and ether.

Medical Properties and Action.—It produces a sedative effect upon the circulatory system, and especially upon the cerebro-spinal nervous system, and is also an antispasmodic.

Therapeutic Uses.—Bromide of camphor is employed as a sedative and antispasmodic, in affections of the nervous system, and where camphor is indicated, as in asthma, neuralgia, hysteria, delirium tremens, etc.

Dose.—Of bromide of camphor, gr. ij to gr. x, for an adult.

Dental Uses.—In dental practice the bromide of camphor is employed as a sedative in convulsions of dentition, neuralgia, etc. For children suffering from the convulsions of dentition, gr. j of the bromide of camphor in acacia mucilage, and administered every hour, has been very serviceable in arresting the paroxysms.

CAPSICUM.

CAYENNE PEPPER.

Source.—Capsicum is obtained from the tropics of both hemispheres, being the fruit of capsicum annuum, and of other species of capsicum. The crimson or yellow pods are dried and ground to powder, which has a bright red color, and an aromatic smell, with a bitter, acrid, burning taste. Its acrid, pungent qualities are due to a peculiar substance in the form of a thick, yellowish-red fluid, called *capsicine.*

Medical Properties and Action.—Capsicum is a powerful stimulant, producing, when small doses are taken, a sensation of warmth in the stomach, and a general glow over the body. It promotes the digestive process, and stimulates the circulation, and also the genito-urinary organs. In excessive doses, capsicum is an irritant poison.

Therapeutic Uses.—It is employed in certain forms of dyspepsia, flatulent colic, scarlet fever, yellow fever, delirium tremens, opium habit, etc., etc. Externally or locally as a gargle, in putrid or other forms of sore throat, chronic inflammation of the fauces, hoarseness due to relaxed condition of the vocal

cords, relaxed uvula, and in poisoning by opium, belladonna and aconite, it has proved useful as a stimulant.

Dose.—Of powdered capsicum, gr. v to gr. x, in pill. Of the tincture of capsicum—*Tinctura Capsici* (capsicum ℥j, to diluted alcohol, Oij—the dose is ♏x to f℥j.) Of the infusion—*Infusum Capsici* (capsicum ℥ss; boiling water Oj)—the dose is f℥ss. The infusion is also used as a gargle.

Dental Uses.—In dental practice the tincture of capsicum is serviceable in the early stages of acute periodontitis; and also where it is necessary to hasten suppuration as quickly as possible, on account of the increasing severity of the attack—a solution composed of gtt. xxv, in a glass of warm water, of which a mouthful is to be retained for some minutes.

The tincture of capsicum is also useful in chronic dental periodontitis, to resolve the inflammatory products. It is also used to stimulate the gums and mucous membrane of the mouth, in chronic inflammation and ulceration, and for looseness of the teeth as a result of salivation; also in cases of turgidity and puffiness of the gums. It is often serviceable in chronic alveolar abscess as an injection, after the sac has been destroyed, also in recession of the gums from the necks of the teeth, for the purpose of stimulating them. A few drops added to a solution of aromatic sulphuric acid will prove serviceable in caries of the maxillary bones, and in disease of the antrum. An efficacious stimulant gargle may be made of the tincture of capsicum ℥ss to rose water ℥viij. Dr. Kirk recommends capsicum as a local stimulant and counter-irritant in the initial stages of pericemental inflammation before the formation of pus has taken place; in cases of soreness about roots of pulpless teeth, due to external violence, cold, etc., and not to septic irritation; for relief of severe neuralgias following the extraction of lower molar teeth, in the form of a cataplasm applied to the affected side of the face, or by moistening a piece of heavy blotting paper and applying this to the side of face. Dr. J. F. Flagg recommends the use of capsicum for pericemental inflammation in the form of the powder sewed in small linen bags to be placed in the mouth over root of affected tooth. Dr. Leffmann recommends small oval disks cut from capsicum plaster (Seabury & Johnson's), the surface of which has been lightly anointed with the ethereal ex-

tract, or oleoresin of capsicum, which can be nicely adapted to the gum; the oleoresin is the most irritating preparation of camphor, and is used as a counter-irritant.

CARBO ANIMALIS PURIFICATUS—PURIFIED ANIMAL CHARCOAL.

Source.—Animal Charcoal, called "bone black," is obtained by exposing bones to a red heat, protected from the air. It consists of charcoal, phosphate and carbonate of lime.

PURIFIED ANIMAL CHARCOAL—*Carbo Animalis Purificatus*—is obtained by digesting bone-black in hydrochloric acid and water to a moderate heat, when it is dried and heated to redness in a covered crucible.

Properties and Action.—Animal charcoal is an absorbent and deodorizer and is used to counteract the effects of poisonous agents, such as the alkaloids and acids. In preparing organic solutions it is used as a decolorizing agent.

Dose.—Of animal charcoal as an absorbent, ℥ss, to neutralize the effects of each grain of such agents as strychnia and morphia.

CARBO LIGNI—WOOD CHARCOAL.

Source.—Wood Charcoal is obtained by subjecting soft wood to a red heat with but a limited supply of air, by which the water, etc., are removed, allowing the carbon to remain.

Properties and Action.—Wood charcoal is antiseptic and disinfectant, deodorant and detergent, and is very serviceable in correcting the fetor of discharges and arresting the process of ulceration, especially when in the form of the dry powder, or mixed with linseed as a poultice.

Therapeutic Uses.—For foul and gangrenous ulcers, gangrene, phagedæna, suppurating surfaces, cancerous tumors, etc., etc.

Dental Uses.—The powdered charcoal added to water, in the proportion of one or two drachms to a glass of water, forms an efficient disinfectant gargle for the offensive fetor of mercurial stomatitis; also useful in foul and gangrenous ulcers of the mouth, diseased gums, offensive ulcerations, offensive fetor of cancrum oris, etc., etc. Notwithstanding its detergent prop-

erties, injury results from its use as a dentifrice, on account of its tendency to cause recession of the gums from the necks of the teeth.

CARVACROL.

Formula.—$C_{10}H_{13}OH$.

Source.—The caraway plant is a native of Europe.

Derivation.—Carvacrol is a product of the essential oil of caraway, which is obtained from the seeds of the plant. Caraway—*carum*—seeds are of a light yellow color, with a pleasant aromatic smell, and a sweetish, warm, spicy taste. They are stomachic and carminative, and are occasionally used in flatulent colic, as a corrective of other medicines. The volatile oil of caraway is most employed in doses of gtt. j to gtt. x. CARVACROL is obtained by treating the oil of caraway with iodine, and washing the product with potassa, when it is mixed with carvene, which is one of the liquid oils of caraway. Carvacrol is also found among the products of the action of iodine on camphor. When pure, it is a colorless, viscid oil, lighter than water, in which it is nearly insoluble. Its odor is like that of creasote, and its taste is persistent, strong and acrid.

Medical Properties and Action.—Carvacrol is antiseptic, carminative, disinfectant and escharotic. Combined, it forms an efficient gargle in inflammatory conditions. It is not employed internally.

Dental Uses.—In dental practice, carvacrol has been employed as a substitute for creasote, carbolic acid and glycerole of thymol, in the treatment of odontalgia, sensitive dentine, alveolar abscess, and as an antiseptic in the pulp canals of teeth; also as a gargle in inflamed and ulcerated conditions of the mucous membrane of the mouth, tonsilitis, etc. Combined with water, in the proportion of 3 drops to the ounce, it forms an efficient gargle in stomatitis, tonsillitis, etc.; the strength of the solution may be increased, when a more powerful action is required. It is also employed with advantage in sensitive cavities of the teeth, in operating with the dental engine, to lessen the pain from friction of the instrument. As an application in odontalgia, from an exposed and irritable pulp, it affords almost instantaneous relief. It is claimed for carvacrol, that it is not so liable to cause inflammation

as creasote; especially when it is applied through the pulp canals. When employed to obtund the sensitiveness of dentine, it is necessary to confine it in the cavity of the tooth for a few days, by means of a temporary filling of zinc preparation, as it readily dissolves Hill's Stopping and gutta percha. When it is used in the form of an injection in alveolar abscess, a sharp, burning sensation is experienced as soon as it reaches the seat of the affection, when the crown cavity of the tooth should be immediately closed.

In patients of a scrofulous diathesis, it is necessary to exercise care in the use of carvacrol. When applied to cavities before the introduction of the filling, and to exposed pulps, it is introduced on a pellet of cotton.

CATECHU—CATECHU.

Source.—Catechu is obtained from the wood of the Acacia catechu, a large tree of Pegu, and is in the form of large, hard, and brittle masses, porous on fracture, and possessing a strong astringent and sweetish taste. The compound tincture and the troches are employed.

Medical Properties and Therapeutic Uses.—Catechu is a valuable astringent, and is frequently employed in diarrhœas of relaxation, and locally in gonorrhœa or leucorrhœa in the form of injections.

Dose.—Gr. j to xxx.

Tinctura Catechu Composita.—Compound Tincture of Catechu (catechu, 12; cinnamon, 8, in diluted alcohol, q. s. ad. 100 parts).

Dose.—ɱxf℥j.

Dental Uses.—Catechu is a valuable local astringent in the form of a mouth wash for spongy gums, and relaxed condition of the oral mucous membrane.

For Hemorrhage after Extration of Teeth.

Dr. D. A. Rosenthal.

(For Internal Administration.)

℞ Tinct. catechu . . . . . f℥j
Tinct. digitalis . . . . . f℥iss
Extr. ergotæ. fl. . . . . q. s. ad. f℥ij. M.
Signa.—A dessertspoonful every two hours.

CHINOLINE OR QUINOLINE.

Formula.—C_6H_7N.

Derivation.—Chinoline was first obtained from coal tar, but afterward from the cinchona alkaloids. More recently it has been produced by the action of glycerine on aniline, or nitro-benzol. It is an oily liquid, with highly refracting property, and it combines with acids to form salts. The salt, *Tartrate of Chinoline*, is not so deliquescent as the other salts formed by its combination with acids, and is in the form of lustrous crystals, which preserve their form even in a damp atmosphere, although they are soluble in water. Chinoline is very soluble in alcohol, and sparingly soluble in water.

Medical Properties and Action.—Chinoline, like other phenol derivatives, such as resorcin, hydroquinone, etc., possesses the power to lower fever heat, but does not affect the normal temperature.

Therapeutic Uses.—Like resorcin, chinoline has been used in intermittent and remittent fevers with great success; also in septic disorders. Topically, chinoline is a valuable antiseptic, and successfully acts upon minute organisms, preventing their increase and septic decomposition. A five per cent. solution of the tartrate of chinoline, the salt generally employed, has been applied locally in diphtheria, with marked effect.

Dose.—Of chinoline, gr. v to xv.

Dental Uses.—Chinoline is used in dental practice as an antiseptic, belonging to the same class as resorcin, the salt tartrate of chinolin, in the form of a five per cent. solution, being preferable for local application. It is also used in combinaton with carbolic acid, for application on cotton to an aching cavity from which a tooth has been extracted.

CHLORIDE OF ALUMINIUM—ALUMINII CHLORIDIUM—CHLORALUM.

Formula.—Al_2Cl_6.

The chloride of aluminium, also known as *Chloralum*, is prepared by passing chlorine, at high temperatures, over a mixture of aluminium and charcoal. By placing the anhydrous chlorides of aluminium in water, it is converted into hydrated chloride. It

is said to be quite as potent as chloride of zinc or carbolic acid, and devoid of poisonous properties and unpleasant odor, and is unirritating, rendering it a useful antiseptic and disinfectant. As it does not cauterize, it is especially convenient for applications to the mouth. The taste is sharply saline, like that of alum, and its action closely approximates that of chloride of zinc.

In dental practice it has been used in the treatment of periodontitis, alveolar abscess, caries of bones, putrid pulps, alveolar pyorrhœa, and other diseases of mucous membrane.

CHLORIDE OF METHYL—METHYL CHLORIDE.

Formula.—CH_3Cl.

Derivation.—Chloride of Methyl is produced by the action of chlorine upon marsh gas; by heating together common salt, sulphuric acid and methyl alcohol; or it is more cheaply manufactured by using the waste products of beets used in the manufacture of sugar. It is the chloride of a hydrocarbon in the form of methyl chloride, and resembles ether in appearance, taste and smell, but is less inflammable. Chloride of Methyl is generally employed as a local anæsthetic in the form of spray, although it possesses general anæsthetic properties also, and being very volatile and ether-like, rapid evaporation occurs when it is applied over an affected area. To avoid producing inflammation of the skin, or an erythema in persons having an irritable skin, caution is necessary; and it should be applied over as many nerve filaments as possible. The special advantage of chloride of methyl is its external application, which may never cause more than a temporary irritation of the skin. In order to produce local anæsthesia with this agent, M. Bardet proposes before spraying a surface with it, to paint it with glycerine, the revulsive action being less severe, and the glycerine forming a surface on which the drops of the refrigerant mixture collect, and which may be readily removed after the desired effect has been produced; the use of glycerine is also said to prevent the dangers of sloughing. Dr. Ch. Bailly recommends the following method of applying this agent as a local anæsthetic: A tampon of dry cotton covered with dry silk is sprayed with the anæsthetic until its temperature is reduced to 23°–55° C. below zero. The

tampon is then grasped with ebony pincers and applied for a few seconds to the parts to be anæsthetized, and perfect abolition of pain at once secured. Drs. Daboll and Rhein recommend chloride of methyl as an application for trigeminal neuralgia, giving immediate relief by paralyzing the small filaments of the nerve. The spray is also used for obtunding sensitive dentine; it produces a more intense cold than ether, and with less pain, its obtunding effect lasting a longer time.

CHLORAL.

CHLORAL HYDRAS—HYDRATE OF CHLORAL.

Formula.—$C_2HCl_3OH_2O$.

Derivation.—Chloral is obtained by the action of dry chlorine gas on absolute alcohol, and is purified by sulphuric acid and a small quantity of lime; a small quantity of water converts it into solid crystalline hydrate of chloral. It is in the form of a snow-white, crystalline mass, with a pungent odor and taste, soluble in its own weight of distilled water, and very soluble in alcohol. When heated, it fuses and evaporates, leaving no residue, and in the air without combustion.

Medical Properties and Action.—Hydrate of chloral is hypnotic and anæsthetic, possessing more of the former and less of the latter property than chloroform, and, unlike chloroform, after its administration there is no elimination by the breath or urine. It diffuses into the blood rapidly, causing an abundant flow of saliva, and a cooling sensation in the stomach, followed by warmth. Very large quantities cause a high degree of gastric irritation, nausea and vomiting; very large doses of chloral paralyze the heart, and produce a fall of arterial pressure, and a slow, feeble, or sometimes a rapid running pulse. The blood becomes dark and grumous-looking with the corpuscles broken down. Taken in moderate quantity it stimulates the appetite, and produces muscular relaxation. It is uniformly certain in its action as a hypnotic, has no depressing influence, and does not cause constipation. Administered in doses of gr. x to gr. xxx, it causes unconsciousness to pain, and a profound sleep, lasting over several hours. The sleep it produces is quiet and gentle, and induced without distress. Liebreich claims to have pro-

duced sleep which lasted from five to fifteen hours, with from 25 to 30 grains of hydrate of chloral.

The habitual use of chloral leads to a disorder which is somewhat similar to the "opium habit," although it may not be as persistent. When there is present no susceptibility to its hypnotic action, it is liable to cause headache, and in some cases, a delirious excitement. Its hypnotic action is immediately preceded by a stage of excitement, generally of short duration, which is followed by sudden and complete sleep, very much like natural sleep, calm, dreamless and refreshing. It differs from a condition of narcotism from the fact that the patient can be easily roused to partake of nourishment, and will readily fall asleep again.

There are no unpleasant after-effects resulting from a moderate dose of chloral, differing in this respect from morphine, which often causes headache, faintness, giddiness, nausea and constipation. Chloral is not capable of producing insensibility to pain, unless the quantity administered is sufficient to suspend the functions of the cerebrum. Great care is necessary in its use where symptoms of pulmonary disease, fatty-heart or degenerated blood vessels are apparent.

When a proper dose is administered the pupil contracts slightly, but the pulse may remain unaltered or become slower, and the respiration unaffected. When an improper or dangerous dose is taken, profound narcotism ensues, the respiration becomes slower, the pulse weak, rapid and irregular, sensibility is lost, all reflex movements are impossible, and complete muscular relaxation follows. It destroys life by the suspension of the functions of the cerebrum, and by paralysis of the respiratory centre, and of the cardiac ganglia; also death may suddenly follow by paralysis of the heart, in cases of fatty degeneration, and the lower lobes of the brain remain unaffected. The paralytic phenomena caused by chloral are due to its direct action on the nervous centres. The congestion of the meninges of the brain and cord, and distention of the right cavities of the heart, have been observed after poisoning by chloral. The antidote in cases of poisoning is strychnia, and the same treatment as in opium poisoning.

Therapeutic Uses.—The most important uses of chloral are in diseases of the nervous system, such as delirium tremens, insan-

ity, tetanus, acute mania, neuralgia, chorea, whooping-cough, and in rheumatism, cholera morbus, seasickness, etc., etc. Having no direct pain-relieving power, except by suspending the functions of the cerebrum and in dangerous doses, sleep can be procured and pain relieved by combining the chloral with morphine, when it is very effective.

Dose.—Of hydrate of chloral, gr. v to gr. xx; and it must be remembered that one-half drachm has produced poisonous symptoms. Thirty grains of hydrate of chloral are equal in effect to gr. j of opium. For adults, if short intervals of sleep are required, from gr. xx to xxx will answer; for young children, gr. vij is the dose recommended. Moderate and frequently repeated doses are better than a single large one.

Dental Uses.—In dental practice, the hydrate of chloral, n thef form of gr. ss to gr. j, is applied to inflamed pulps for the rielie of odontalgia, and is an efficient remedy; it is also employed for the relief of neuralgia of the fifth pair of nerves; as a stimulant and deodorizing application to foul and fetid indolent ulcers; also as a local anæsthetic, for this purpose being combined with camphor and other agents (see Aconite), (see Camphor); also as an anodyne, for the relief of the pain of periodontitis; and as an injection, for alveolar abscesses. It is also used as a lotion (when diluted with water) for inflammations of the oral mucous membrane, and as an antiseptic (chloral, ℥j; aqua, f℥ij) for injecting putrid pulp-canals and chronic alveolar abscesses. Although it is employed hypodermically, yet painful phlegmons have resulted from its repeated application.

Chloral Phenol.—When chloral is combined with carbolic acid it liquefies, and a preparation composed of equal parts of phenol and chloral is used for odontalgia as well as for its antiseptic qualities. *Chloral Phenol* is a colorless, clear liquid, soluble in alcohol, acetic acid, amyl-alcohol, chloroform, carbon, glycerin and ether. It possesses the odor and taste of its constituents.

Chloral has the property, when rubbed with certain bodies, such as camphor, of forming there with syrupy liquids. With phenol (absolute carbolic acid) it also liquefies, and a preparation composed of equal parts of phenol and chloral is used in dentistry for allaying toothache, as well as for its antiseptic properties. A recent study by Fabini, says the *Chemist and Druggist*, shows that

chloral-phenol possesses the odor and taste of its constituents, and when applied to the skin produces inflammation and an eruption of small blisters. It is a colorless and clear liquid, having a sp. gr. at 20° C. of 1.289, so that it sinks in anhydrous glycerin. It is soluble in alcohol, acetic acid, amyl-alcohol, chloroform, carbon bisulphide, and glycerin, as well as in ether when slightly warmed. It is only partially soluble in petroleum ether, and benzine only dissolves a little of the fluid, and what is dissolved is chloral-phenol. Fabini tested the fluid thoroughly, with a view to determining whether it is a mechanical mixture, and it behaved in every way toward re-agents as carbolic acid does, while with sulphuric acid some of the chloral-phenol yielded, after twenty-four hours, a velvet-colored plaster-like mass, which consisted of meta-chloral and phenol-sulphonic acid. There seems to be no doubt, therefore, that chloral-phenol is a mixture.

This preparation should not be confounded with the phenol camphor devised by Cockrane (not campho-phenique), and made by mixing together 1 part of carbolic acid and 3 parts of camphor. After twenty-four hours this becomes a liquid, having a sp. gr. of 990. It is used with oil as an antiseptic. As a spray it may be applied to the skin to produce local anæsthesia. It may be employed for disinfecting surgical instruments, and upon wool and gauze for wound dressing. It is soluble in alcohol, ether and oils, but not in water or glycerin. Menthol, cocaine, salicylic acid, iodoform, chloral hydrate, and mercuric chloride are soluble in phenol camphor.

Butyl-chloral Hydrate is similar in its action to chloral, the dose being gr. 5–15.

DENTAL FORMULÆ.

For Foul and Fetid Indolent Ulcers.

℞ Chloral hydratis . . gr.x
Aquæ destillatæ . . . f℥j. M.
SIGNA.—To be applied as a lotion.

For a Local Anæsthetic.

℞ Chloral hydratis . . ℥ij
Pulveris camphoræ . ℥ij. M.
SIGNA.—To be applied as an obtunding mixture, by means of an applicator.

For Odontalgia—Pulpitis

FLAGG.

℞ Chloral hydratis . . . ℥iij
Aquæ destill. . . . . f℥j. M
SIGNA.—Apply on cotton.

For Foul and Fetid Indolent Ulcers.

℞ Chloral hydratis . . ℥ss
Adipis . . . . . ℥j. M.
SIGNA.—To be used as an ointment.

Local Anæsthetic.

DR. STORIE.

℞ Chloral hydratis,
Camphoræ (gum) . equal parts.
Rub well in a mortar to liquefaction and add gtt. v of carbolic acid.

For a Hypnotic.

℞ Chloral hydratis . . ℥ij
Syrupi aurantii flores ℥iv
Syrupi tolutani . . ℥iv
Aquæ destillatæ . . ℥vj. M.
SIGNA.—Dose 1/6 part, largely diluted.

For Neuralgia.

℞ Chloral hydratis . . partes 3
Camphoræ . . . partem 1. M.
SIGNA.—To be applied over seat of pain.

For a Local Anæsthetic.

℞ Chloral hydratis,
Pulveris camphoræ āā℥ij
Morphinæ sulph. . . ℥ss
Chloroformi . . . . ℥j. M.
SIGNA.—Apply with camel's-hair brush; dry rapidly, and reapply.

For Neuralgia and Exposed Pulps.

℞ Chloral hydratis . . 2 parts
Camphoræ . . . . . 5 parts
Cocaini hydrochloratis 1 part. M.
Heat to about boiling point of water till liquefied.
SIGNA.—Apply locally.

Local Anæsthetic.

℞ Chloral hydratis . . gr.xx
Mur. cocaine . . . . gr.vj
Aquæ destill. . . . . ℥vj
Acidi Carbolici . . . ♏ij. M.
SIGNA.—First administer 1 drachm of aromatic spts. of ammonia; then inject a small quantity of the mixture at 2 or 3 points under the gum, wait 5 minutes, and then operate.

To Alleviate the Pain of Tooth Extraction.

DR. GLASSINGTON.

℞ Chloral hydrate,
Camphoræ . . . . . āā℥ij
Tinct. aconite,
Chloroformi . . . . āā℥1/2. M.
SIGNA.—Apply carefully with a camel's-hair brush over root of tooth to be extracted, and allow it to remain 1 or 2 minutes before operating.

CHLORALAMIDE—CHLORALAMID.

Formula.—CCl_3—CHNH.

Derivation.—Formed by the combination of two parts of chloral hydrate and one part of formamide.

Medical Properties and Action.—Chloralamid has been used with good results in hysteria, chorea, acute mania, monomania, typhoid fever, senility, neurasthenia, insomnia, phthisis and diseases not attended by much pain. Mupfenbach, from a number of trials, regards it as a useful hypnotic, but with the disadvantage that its certainty of action can never be relied upon. No bad

effects upon the circulation or in the feelings of the patient have been observed by Reichmann, although vomiting may occur. According to Langaard, this drug produced a decided reduction of blood-pressure, which is developed more gradually and is later in making its appearance than that caused by chloral. Compared with chloral, chloralamid is more agreeable to the taste, and more easily administered, rarely causes digestive disorders, does not depress the heart or the circulation, seldom produces cerebral disturbances. Compared with sulphonal, it is more prompt in its action, more soluble, more easily administered, the sleep it produces always passes away by morning, and it is less expensive.

The action of chloralamid upon digestion is as follows:

1. Large quantities retarded the digestion of fibrin in the ratio of the quantity employed.

2. Small quantities, for example, up to 0.02 gramme, did not have any marked influence either in accelerating or in delaying the digestion of fibrin.

3. Putrefaction was not retarded by either large or small quantities.

Therapeutic Uses.—The most important uses of chloralamid are in diseases of the nervous system not attended by much pain, such as have before been enumerated.

Dose.—Of chloralamid, gr. 30 to 45. In doses of twenty to thirty grains it produces better effects than sulphonal, but caution in the use of this drug is necessary in diseases of the heart, on account of its causing decided reduction of blood-pressure.

DENTAL FORMULA.

For Use as a Hypnotic.

℞. Chloralamid . . . . . ℥iv
Spts. vini gallici. . . . . ℥ij
Curacao. . . . . ℥ij. M.

SIGNA.—A tablespoonful (30 grains chloralamid) in water and repeated in 4 hours if necessary.

CHLORETONE—TRICHLOR TERTIARY BUTYL ALCOHOL.

Chloretone is a derivative of chloroform and acetone, in the form of a white crystalline compound with an odor like that

of camphor. It is highly soluble in chloroform, ether, acetone, alcohol and in glacial acetic acid; also soluble to the extent of one per cent. in cold water, but more soluble in boiling water. Chloretone, or aceton-chloroform, was produced synthetically by Willgerodt in 1881, and unaware of these experiments, John J. Abel in 1891 discovered its value as a practical hypnotic and anæsthetic.

Medical Properties and Therapeutic Action.—Experiments with moderate doses of chloretone on animals caused a profound sleep and complete anæsthesia which lasted for several hours; and very large doses induced anæsthesia which continued for four days, without ill effects on recovery. It has no action on the blood, and no toxic effect on the heart, and is supposed to be decomposed in the body, as the largest doses failed to show any signs in the urine, and its use increased the chlorides in the urine. Given internally, in doses of from gr. v to 20, chloretone facilitates etherization and prevents vomiting; it is also administered in connection with nitrous oxide gas.

It is a local anæsthetic, antiseptic and hypnotic; also a nervous sedative, its action resembling that of chloral, but not depressing the heart or respiration, unless excessive quantities are given; it also acts as a sedative to the stomach without irritating it. It is efficient in vomiting due to irritation, and relieves the pain of gastric carcinoma. Donald reports a case in which 120 grains of chloretone were taken in the course of 24 hours, which caused a profound sleep lasting for six days, without any bad effects except gastric irritability. Its advantages over cocaine are that it does not depress the heart or lower the blood-pressure, does not effect the vaso-motor nerve supply, and will not destroy cell vitality; also that chloretone solutions will keep indefinitely.

The one per cent. solution has marked germicidal properties, and is used as a local anæsthetic to irritable ulcers, and infected wounds. It is also effective as a local anæsthetic in minor surgical operations.

Dose.—Of chloretone, internal dose gr. v to 20; gr. viij to xx have been given in 12 hours, in the form of sugar-coated tablets of 3 grains each.

Dental Uses.—For a local anæsthetic in the extraction of teeth; as an obtundent for hypersensitive dentine; for the

removal of living pulps of teeth; for relief of pain in setting crowns and bridge-work; the ethereal solution being employed in removing pulps. It appears to possess all the good qualities of cocaine and betaeucaine, without any of the objectionable effects of either. Dr. M. Leo recommends a solution for extracting teeth, prepared by mixing 15 per cent. of alcohol with 85 per cent. of distilled water and adding enough chloretone to make a saturated solution: also a solution made by mixing equal parts by weight of ether and chloretone, for use as an obtundent in preparing painful cavities for fillings, and setting crowns, and bridge-work.

Dr. A. I. Welsh recommends the following solution, which he claims to have used on hypersensitive dentine with marked success, and which, in preparing cavities in teeth, caused but little pain: ℞. Chloretone ʒ1/2, sulphuric ether ʒij, aquæ distill. q.s. to make 1 ounce. After standing, this solution being non-miscible, divided into a solution of chloretone and ether, and a solution of chloretone and water. The floating ethereal solution was used with success on sensitive dentine; the aqueous solution under the ether layer was injected into the gums for the extraction of teeth, and in one case nine teeth were extracted with little pain, and with less risk than when cocaine is used. Dr. C. E. Klopp suggests a solution of 1/2 drachm of oil of gaultheria, 1/2 drachm of pure alcohol, to which 18 grains of chloretone are added; after the chloretone is dissolved, the mixture is added to 1 ounce of distilled water and then filtered to obtain a clear solution, and claims great success with it in the extraction of teeth. Some recommend waiting six or seven minutes after injecting before operating. For hypodermic use only the aqueous solution of chloretone is employed.

Dentalone.—A saturated solution of chloretone in a liquid composed of the oil of cloves, oil of gaultheria, and oil of cassia. Dentalone is a valuable anodyne application to exposed pulps, being a local anæsthetic and analgesic. It can be applied on lint or cotton, without dilution to the inflamed pulp and will obtund the pain, for this purpose it is superior to either carbolic acid or creasote. The oils in which chloretone is dissolved combine to produce a sedative effect as well as an aromatic one in addition to their solvent property; it is claimed that dentalone is superior

to carbolic acid and creasote in the treatment of root canals and acts as a local anæsthetic. In the essential oils chloretone dissolves to the extent of over 30 per cent.

CHLORINIUM—CHLORINE.

Samboy.—Cl.

Derivation.—Chlorine is a greenish-colored gas, of a penetrating and suffocating odor, very persistent and characteristic. It is soluble in water, in the proportion of two volumes of the gas to one of water, and is a supporter of combustion. It is generated from black oxide of manganese, hydrochloric acid and water, is an active irritant, and, when breathed, excites cough, a sense of suffocation and irritation of the mucous membrane of the nostrils and bronchial tubes, and, when considerable quantities are inhaled, it induces spitting of blood, violent pains, and sometimes death. It is a deodorizer, antiseptic and disinfectant, and has been used to destroy disease germs and offensive effluvia.

CHLORINE WATER.—*Aqua Chlori—Formula.*—H_2O2Cl—is an aqueous solution of chlorine, formed by passing the gas through water. It is a greenish-yellow liquid, with an astringent taste and the suffocating odor of chlorine gas. It should be kept in glass-stoppered bottles, in a cool place, and protected from the light. Chlorine water, *Aqua chlori*, contains 0.4 per cent. of chlorine gas.

Therapeutic Uses.—Chlorine water is used internally in malignant fevers, such as scarlet fever, typhus, and in diphtheria, aphthæ, gangrene, syphilis, diseases of the liver, skin diseases, etc., and as an antidote for hydrocyanic acid. The poisonous effects of chlorine gas may be prevented by ammoniacal gas. Albumen is the antidote for chlorine water, given freely, in the form of milk, flour, eggs, etc.

Dose.—Of chlorine water, f℥j to f℥iv, diluted.

Dental Uses.—Chlorine water is employed in dental practice as a local application in gangrene of the mouth and fauces, aphthæ, cancrum oris, and fetor of the breath. Chlorine gas has been employed to bleach discolored teeth, care being taken that it reaches no other part than the cavity of the tooth undergoing such treatment, which may be accomplished by the appli-

cation of a large rubber dam, such as is used in the operation of filling teeth. The value of chlorine as a bleacher depends in a great measure upon its affinity for oxygen, by which it breaks up the color molecule or sets free oxygen from the water molecule. To accomplish either of these results, it must be applied in solution, or in a loosely combined form.

DENTAL FORMULÆ.

For Aphthæ and Gangrene of the Mouth.

℞ Aquæ chlori . . . . ℥ss
Aquæ destillatæ . . . ℥iiiss
Syrupi simp. . . . . ℥ss. M.
SIGNA.—To be used as a gargle or lotion.

For Fetor of the Breath and an Antiseptic.

℞ Liquoris chlori . . . ℥iv
Mellis . . . . . ℥iv
Aquæ destillatæ . . . ℥x. M.
SIGNA.—To be applied as a gargle.

For Aphthæ, Stomatitis, and Cancrum Oris.

℞ Liquoris chlori
Mellis . . . . . āā℥ij. M.
SIGNA.—To be applied as a lotion.

For Mercurial Stomatitis.

℞ Liquoris chlori . part j
Aquæ destillatæ . parts viij. M.
SIGNA.—To be used as a gargle for correcting the fetor, and diminishing slightly the discharge.

CHLOROFORMUM—CHLOROFORM.

Formula.—$CHCl_3$. Sp. gr. 1.491.

Derivation.—Chloroform is obtained by the distillation of alcohol with chlorinated lime, or by the action of chlorine upon alcohol. It is a colorless, limpid, neutral, and volatile fluid, with a hot, aromatic, sweetish taste, and a peculiar fragrant odor. It is readily soluble in alcohol and in ether, and, if pure, it sinks into water as transparent globules free of milkiness. It is antiseptic, and will not coagulate albumen. It should be kept in a dark, cool place. If exposed to the light for any length of time, chloroform becomes unfit for use as it develops chlorine, hydrochloric acid, and carbonyle chloride. The presence of acid in chloroform will turn blue litmus paper red, and if chlorine is present it will form a white precipitate with nitrate of silver. If impure from improper manufacture, an oily odor will remain on the hand after evaporation. Chloroform fit for use (*Chloroformum Purificatum*) should have a specific gravity of from 1.491 to

1.525, absolutely transparent and colorless, neutral to test paper, non-irritating when inhaled, and should evaporate entirely, leaving no residue or smell on a glass surface. Chloroform purified by crystallization is considered to be the best form for purity. The boiling point is 142° F. Chloroform is soluble in 200 volumes of cold water, and freely soluble in alcohol, ether, benzine, benzol and the oils; its composition is 99 to 99.4 by weight of absolute chloroform and 1 to 0.6 per cent. of alcohol.

Medical Properties and Physiological Action.—Chloroform, when inhaled, is an anæsthetic; and when administered internally, is anodyne and antispasmodic; it is also a solvent. Its effects on the system are similar to those of ether, but more powerful and more rapidly produced, and it requires more care in its administration, both internally and by inhalation of the vapor. When inhaled, the vapor of chloroform causes a sensation of warmth in the mouth and throat, a sense of relaxation, and finally unconsciousness. Respiration is at first full and deep, but soon becomes more rapid and shallow. The pulse becomes at first somewhat fuller and stronger for a short time, and then fails in strength, and is more rapid. Total muscular relaxation is dangerous. The effect on the air passages is slight irritation, with no primary arrest of the respiration, as in the case with ether. The pupils at first slightly dilate, but afterwards contract: but if they dilate after such contraction the case becomes dangerous, and death may suddenly ensue. In some patients the first effects of the chloroform are violent struggles, and, in such cases, it is dangerous to continue the inhalation rapidly; it is at least five times as dangerous as ether. Drunkards and athletes are prone to be thus affected. When taken internally it causes a feeling of warmth in the stomach, followed by coldness, similar to ether, and if taken in large quantity, undiluted, it acts as an irritant poison, inducing violent gastritis. It is diffused into the blood, and affects remote parts. It increases the action of the circulatory system, producing excitement of the brain, followed by a deep, heavy sleep; and in poisonous doses stupor and insensibility.

The first effect of chloroform is upon the brain, then upon the sensory portion of the spinal cord, then the motor part of the cord, then the sensory parts of the medulla oblongata, then

its motor portion, thereby causing death through the failure of the vaso-motor and respiratory centres, unless heart failure has already taken place, which is not usually the case.

When locally applied, chloroform acts as an irritant and anæsthetic on the sensory and motor nerves, but when inhaled has little or no effect on these nerve trunks. Recent investigations have shown that "the primary action of chloroform on the vital functions of circulation and respiration is greatly to depress the vaso-motor system, thereby causing an extraordinary fall of blood-pressure. Some cardiac enfeeblement and dilatation adds to the fall of pressure." Chloroform has little or no effect upon the blood when it is inhaled, but lowers the bodily temperature by assisting in the dissipation of heat, and its action on the nervous production of heat. Owing to its great volatility, chloroform is rapidly eliminated by the kidneys and lungs. Chloroform is used as an antispasmodic to arrest infantile convulsions, acute attacks of asthma, puerperal and uremic convulsions; as an anodyne in labor pains.

Locally applied to the skin, it causes redness and burning and if confined so that evaporation is prevented, will induce vesication. It is somewhat anæsthetic when locally applied, but is also a powerful irritant, and may be used as a counter-irritant in cases of neuralgia, etc. The vapor of chloroform when inhaled produces symptoms similar to those of ether, except that the sensations of choking are absent, and the stage of excitement is of shorter duration and less violent.

Sabarth has divided chloroform-narcosis into three stages: In the first, the symptoms are similar to alcoholic intoxication. The second stage is that of anæsthesia, consciousness and sensibility are abolished, the muscles are relaxed, and perfect quiet ensues. This is the surgical stage.

The third stage is one of profound narcosis, with stertorous breathing, intense muscular relaxation, abolition of the ordinary reflexes, and fall of bodily temperature. This is a dangerous stage, and its induction is not justifiable, except under very peculiar circumstances.

The following are some of the practical conclusions of the second Hyderabad Commission: "The recumbent position on the back and absolute freedom of respiraton are essential. If

during an operation this position cannot be from any cause maintained during the administration of chloroform, the utmost attention to the respiration is necessary to prevent asphyxia or an over-dose. If there is any doubt about the state of respiration, the patient should be at once restored to the recumbent position on the back. To insure absolute freedom of respiration, tight clothing of every kind, either on the neck, chest, or abdomen, is to be strictly avoided; and no assistants or bystanders should be allowed to exert pressure on any part of the patient's thorax or abdomen, even though the patient be struggling violently. If struggling does occur, it is always possible to hold the patient down by the shoulders, pelvis, or legs, without doing anything that can possibly interfere with the free movements of respiration. An apparatus is not essential, and should not be used, as, being made to fit the face, it must tend to produce a certain amount of asphyxia, and take up part of the attention required elsewhere. However it is made, it introduces an element of danger into the administration. A convenient form of inhaler is an open cone or cap with a little absorbent cotton inside at the apex. At the commencement of inhalation care should be taken by not holding the cap very close over the mouth and nose, to avoid exciting, struggling or holding the breath. If struggling or holding the breath does occur, great care is necessary to avoid an over-dose during the deep inspirations which follow. When quiet breathing ensues, as the patient begins to go over, there is no reason why the inhaler should not be applied close to the face; and all that is then necessary is to watch the cornea and see that the respiration is not interfered with.

In children, the free admission of chloroform into the lungs causes nervous excitement; but the struggling and holding the breath can hardly be avoided, and one or two whiffs of chloroform may be sufficient to produce complete insensibility. They should always be allowed to inhale a little fresh air during the first deep inspirations which follow.

In struggling persons, but especially in children, it is essential to remove the inhaler after the first or second deep inspiration, as enough chloroform may have been inhaled to produce deep anæsthesia, and this may only appear, or may deepen after the chloroform is stopped. Struggling is best avoided in adults by

making them blow out hard after each inspiration during the inhalation. The patient is, as a rule, anæsthetized and ready for the operation to be commenced when unconscious winking is no longer produced by touching the surface of the eye with the tip of the finger.

The anæsthesia should never, under any circumstances, be pushed until respiration stops; but when once the cornea is insensitive, the patient should be kept gently under by occasional inhalations, and not be allowed to come out and renew the stage of struggling and resistance.

As a rule no operation should be commenced till the patient is fully under the influence of the anæsthetic, so as to avoid all chances of death from surgical shock or fright. The administrator should be guided as to the effect entirely by the respiration; and his only object, while producing anæsthesia, is to see that the respiration is not interfered with. If possible the patient's chest and abdomen should be exposed during chloroform inhalation, so that the respiratory movements can be seen by the administrator. If anything interferes with the respiration in any way, however slightly, even if this occurs at the commencement of the administration, if breath is held or if there is stertor, the inhalation should be stopped till the breathing is natural again. This may sometimes create delay and inconvenience, but experience will make any administrator so familiar with the respiratory functions under chloroform, that he will in a short time know almost by intuition whether anything is going wrong, and be able to put it right without delay, before any danger arises. If the breathing becomes embarrassed, the lower jaw should be pulled or pushed from behind the angles, forward, so that the lower teeth protrude in front of the upper. This raises the epiglottis and frees the larynx. At the same time it is well to assist the respiration artificially till the embarrassment passes off. If, by any accident the respiration stops, artificial respiration should be commenced at once, while an assistant lowers the head and draws forward the tongue with catch forceps, by Howard's method, assisted by compression and relaxation of the thoracic walls. Artificial respiration should be continued till there is no doubt whatever that natural respiration is completely reestablished. A small dose of morphia may be injected subcutaneously before chloroform in-

halation, as it helps to keep the patient in a state of anæsthesia in prolonged operation. There is nothing to show that atropine does any good in connection with the administration of chloroform, and it may do much harm. Alcohol may be given with much advantage before operations under chloroform, provided it does not cause excitement, and merely has the effect of giving a patient confidence and steadying the circulation. And it is the opinion of the Commission that "if the above rules be followed, chloroform may be given in any case requiring an operation, with perfect ease and absolute safety, so as to do good without the risk of evil."

In operations on the mouth the chloroform vapor may be administered by passing a soft catheter into the nose and by means of a hand-bulb, or Junker inhaler and thus force the vapor into the post-nasal spaces. The British Medical Association Committee investigations reported the danger ratio of chloroform, nitrous oxide and ether, and ether to be as follows: Chloroform, 9; nitrous oxide and ether, 1.5; ether, 1; nitrous oxide alone, the least dangerous.

[For the Administration of Anæsthetics, Dangers of Anæsthesia, Preventive Measures, and Treatment of Dangerous Symptoms, the reader is referred to the article on Sulphuric Ether.]

Therapeutic Uses.—Besides its use as a general anæsthetic agent, chloroform is internally administered in substance, as an anodyne and antispasmodic, for non-inflammatory affections, such as nausea and vomiting, seasickness, sick headache, flatulent colic, intermittent fevers, and in cholera, for which it is very efficient. The vapor is employed for the relief of hay asthma, whooping-cough, spasmodic asthma, and as a hypnotic in delirium tremens, and as an injection and lotion in neuralgia, and as a counter-irritant or vesicant, for which purposes it is applied to the skin, and evaporation prevented. Great care is necessary in the administration of chloroform in substance, as fatal effects have followed such use; 15 drops have destroyed life. Externally, chloroform is employed as a stimulating application to foul and indolent ulcers. A combination of one-half ounce each of chloroform and ether with 20 grains of menthol and 20 drops of the tincture of iodine, forms a good local counter-irritant.

The antidotes for chloroform poisoning are: Saline infusion; amyl nitrite; tongue traction, and artificial respiration.

Anæsthetic Mixtures.—The A. C. E. mixture consists of 1 part of alcohol (sp. gr. .838), 2 parts of chloroform (sp. gr. 1.497), and 3 parts of ether (sp. gr. .735).

The object of this mixture is to produce the anæsthetic effect of the ether and chloroform without the cardiac and respiratory effects of either, the alcohol being added to act as a stimulant; it is now seldom used.

Schleich's mixtures are composed of chloroform, ether and petroleum ether, the latter boiling at 60° to 65° C. The petroleum ether has no injurious effect, and appears to modify the effect of the chloroform and dilute the ether without changing the general influence of either. Such mixtures are said to cause less mucous secretion, less cyanosis and other disagreeable effects than any single anæsthetic.

Dr. Spark recommends highly, as a hemostatic agent, a solution composed of chloroform 2 parts, water 200 parts. He claims that it acts with a rapidity that is truly marvelous, and it has not the slightest disagreeable taste. It is useful in all operations upon the mouth and throat. Dr. A. Guerin, of Paris, claims that death from chloroform may be avoided if inhaled exclusively through the mouth, holding the nose. When death occurs from stoppage of the heart, the cardiac muscular fibres cease to contract under the influence of a reflex action exerted by the nasal nerves on the pneumo-gastric, stimulating the inhibitory power of the latter on the heart. When a rabbit is made to inhale chloroform directly through an opening in the trachea, the drug has no effect whatever on the heart. On the contrary, when the chloroform is held before the nose of the rabbit, the heart immediately stops.

Dose.—Of chloroform, ♏j to v, in sweetened water or mucilage. Dose of chloroform for inhalation, ℥j to ℥ij.

Spirit of Chloroform—Spiritus Chloroformi—is composed in chloroform, ℥j; diluted alcohol, ℥ij. Dose of spirit of chloroform, ℥ss to ℥j.

Morphia and Chloroform Narcosis.—A method practiced by Prof. Thiersch, of Leipsic, succeeds often in inducing a perfect analgesia without unconsciousness. Morphine is first hypoder-

mically injected, and in from five to seven minutes afterwards the patient is very lightly chloroformed till near the stage of excitement; the operation is performed; as soon as pain is felt, if the operation is a prolonged one, a little chloroform is added. In this manner not the tenth part of chloroform is needed, and it is claimed that the operation is as painless as under full chloroform narcosis, and there is no risk of danger incurred. Men receive one-half a grain of morphine, women one-quarter of a grain, children one-twelfth to one-eighth of a grain.

Cocaine-Chloroform Narcosis.—This consists essentially in the combined use of cocaine and chloroform, and is strongly favored by Prof. Obolinski, of Cracow, who injects either before or after the anæsthesia is obtained, from one to three centigrammes of cocaine; or he injects in the neighborhood of the seat of the operation, and during its progress, from three to seven centigrammes. Cocaine is used on the ground that it is a complete antagonist of chloroform and chloral; but it is not so regarded by others, who represent it to be a general excitor of the central nervous gray matter, rather than a direct and powerful stimulator of the heart, while its stimulant effect upon respiration is not to be depended upon. Prof. Obolinski claims that this mixed narcosis secures anæsthesia with the use of less chloroform, and that vomiting is prevented, and there are fewer disagreeable after-effects.

Dental Uses.—Chloroform is employed in dental practice as a general anæsthetic, also as a local anæsthetic, for which purpose it is generally combined with other agents; as an anodyne and antispasmodic, either locally applied or the vapor inhaled, as in the treatment of convulsions of dentition, for which it is a very efficient remedy.

DENTAL FORMULÆ.

For Neuralgic Affections.

℞ Chloroformi,
Spiriti ammoniæ,
Tincturæ aconiti . āā f℥j
Olei ricini . . . . . ℥ij
Linimenti saponis . f℥j. M.

SIGNA.—To be applied as a liniment over seat of pain.

For a Local Anæsthetic.

℞ Chloroformi purificati,
Tincturæ aconiti,
Alcoholis . . . . . āā f℥j
Morphinæ sulphat. . gr.vj. M.

SIGNA.—Apply for 1 or 2 minutes to gum over root of tooth to be extracted.

For a Local Anæsthetic.

VON BONHORST.

℞ Chloroformi,
Ætheris sulph.,
Spiriti lavandulæ,
Pyrethri (fluid ext.) . āā f℥j. M.

SIGNA.—Apply for 1 or 2 minutes to gum over root of tooth to be extracted.

For Odontalgia—Pulpitis.

℞ Chloroformi . . . . ℥ij
Alcoholis . . . . . ℥j
Æther . . . . . ℥ss
Camphoræ(pulv.) . . ℥ss
Tinct. opii . . . . . ℥ss
Oleum caryophylli . ℥j. M.

SIGNA.—Apply on cotton wool, to exposed pulp.

For Neuralgic Affections of the Teeth.

℞ Chloroformi . . . . f℥j or ij
Aquæ . . . . . Oj. M.

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

For Neuralgic Affections.

℞ Chloroformi . . . . ℥ij
Camphoræ . . . . ℥iss
Olei olivæ . . . . . ℥ij. M.

SIGNA.—To be applied as a liniment over seat of pain.

For Odontalgia—Pulpitis.

℞ Chloroformi,
Tinct. aconiti. . . āā f℥iij
Tinct. capsici . . . . f℥j
Tinct. pyrethri,
Olei caryoph. . . āā f℥ss
Camphoræ (pulv.) . . ℥ss. M.

SIGNA.—Apply on cotton wool.

For an Anodyne Application in Neuralgia.

℞ Chloroformi . . . . f℥j
Linimenti camphoræ f℥ij. M.

SIGNA.—To be applied over seat of pain, and covered with oiled silk, to prevent evaporation.

For Earache of Dentition.

℞ Chloroformi . . . . ℥j
Olei olivæ . . . . . ℥j

SIGNA.—Pour from gtt. x to xx in ear, and close orifice with cotton.

For a Local Anæsthetic.

℞ Chloroformi . . . part xx
Acidi acetici (cryst.) part j. M.

SIGNA.—Apply with camel's-hair brush, or by applicator.

For Excessive Vomiting and Irritability during Infantile Diarrhœa.

DR. JAS. W. WHITE.

℞ Spt. Chloroformi . . ℥j
Creasote . . . . . ♏ij
Vin. ipecac . . . . . ♏v
Aquæ anisi . . q.s.ad. ℥ij. M.

SIGNA.—A teaspoonful in a little water for a child 1 year old.

Local Anæsthetic.

DR. PARSON.

℞ Chloroformi . . . . 12 parts
Tinct. aconiti . . . . 12 parts
Tinct. capsici . . . . 4 parts
Tinct. pyrethri . . . 2 parts
Olei caryophilli . . . 2 parts
Camphoræ . . . . . 2 parts

Dissolve the camphor in the chloroform, then add the oil of cloves, then the tinctures.

For Pain after Extraction.

DR. T. F. CHUPEIN.

℞ Chloroformi . . . .
Tinct. aconiti . . āā f℥j
or
℞ Tinct. camphora . . ℥j
Chloroformi . . . . ℥ij
or
℞ Morphinæ . . . . . grs.iij
Tinct. aconiti,
Chloroformi,
Alcohol . . . . . āā f℥ss

For Pain after Extraction.

DR. D. GENESE.

℞ Chloroformi . . . . 1 part
Tinct. pyrethri . . . 3 parts

Local Anæsthetic.

DR. FRANK ABBOTT.

℞ Chloroformi,
Tinct. aconiti rad. . āā ℥j
Alcoholis . . . . . ℥j
Morphinæ sulph. . . grs.xii

SIGNA.—Used locally.

CINCHONA FLAVA—YELLOW CINCHONA.

CALISAYA BARK—PERUVIAN BARK.

Source.—Cinchona is the bark of the tree cinchona calisaya, which grows on the western coast of South America, especially of Bolivia and Southern Peru. Different varieties are named, according to their color, as *Cinchona Flava*, yellow cinchona; *Cinchona Pallida*, pale cinchona; *Cinchona Rubra*, red cinchona. The medical properties of these barks depend upon the alkaloids they contain in varying proportions, *Quinina* being the most important.

Medical Properties and Action.—The yellow bark has a much more bitter taste than the others, but is comparatively free from acidity. It is brownish yellow, the powder being of an orange color, and it contains more of the alkaloid quinine than the other barks.

Cinchona is tonic, astringent and antiperiodic, and the different varieties owe their tonic and antiperiodic properties to the alkaloids *quinine, cinchonina* and *cinchonidina.* On account of the large quantity of the powdered barks it is necessary to take in order to obtain the full effects, and which cause, in some cases, derangement of the stomach, vomiting, headache and constipation, the alkaloid quinine, in the form of sulphate of quinina, is preferable.

SULPHATE OF QUININA—*Quininæ Sulphas*—is prepared by boiling the yellow bark in water acidulated with hydrochloric acid, by which the alkaloid is separated from its combination with kinic and other acids, to form a soluble hydrochlorate.

This salt is decomposed, and the quinine is precipitated by the addition of lime, and afterwards washed in boiling alcohol.

Sulphate of quinine is in the form of colorless, very light and silky crystals, and is readily soluble in alcohol, and in water acidulated with sulphuric acid. It is insoluble in ether, and requires 740 parts of cold, or 30 parts of boiling water to entirely dissolve it.

Cinchona is also antiseptic, as the powder dusted over unhealthy wounds will arrest putrefaction, and promote healthy cicatrization. Quinina will destroy minute organisms, and preserve substances from decomposition. The cinchona alkaloids are readily diffused into the blood, and when hypodermically injected, are absorbed by the blood. Cinchona and its alkaloids increase the action of the heart slightly, but in large doses quinine depresses the heart's action and enfeebles the pulse. As quinine accumulates in the brain, a sense of fulness in the head, a tightness and constriction about the forehead, a ringing in the ears (*tinnitus aurium*), giddiness and vertigo are experienced. Deafness also occurs, as the effect of considerable doses, and, if continued, permanent injury may result. Poisonous doses cause intense headache, dilated pupils, delirium, coma and convulsions.

Peruvian bark and its alkaloids are the most reliable tonics and antiperiodics.

Therapeutic Uses.—Cinchona, and its alkaloid, quinine, are internally employed in the treatment of intermittent fevers, and also other fevers, such as remittent, typhus, puerperal and scarlet; also in influenza, neuralgias of a malarial origin, acute rheumatism, phthisis, advanced stages of pneumonia and pleurisy, erysipelas, urticaria, diseases of the eye, epilepsy, gangrene and mortification, scurvy, pyemia, malarial dysentery, passive hemorrhages, and as an anthelmintic, etc., etc.

Dose.—Of powdered cinchona, ℈j to ʒiij, given in infusion of liquorice; of the extract of cinchona, gr. j to gr. x, in pill; of sulphate of quinine, gr. j to ℈j.

Dental Uses.—Cinchona and its alkaloid, quinine, are employed in dental practice, in the treatment of neuralgia of the fifth pair of nerves, when due to malaria, in from five to ten grain doses of quinine; in aphthous ulcerations, in one or two

grain doses every two or three hours, especially when there is great debility; and in cancrum oris; also in the form of gargles and lotions, in gangrenous ulcerations of the mouth. Cinchona is also employed in the form of powder, as an ingredient of certain dentifrices, for its tonic and antiseptic properties. (See Quinine.)

DENTAL FORMULÆ.

Dentifrice.

℞ Pulv. cinchonæ flav. ℥iv
Pulv. saponis cas. albi ℥iv
Cretæ prep. . . . . ℥ij
Magnesiæ calc. . . . ℥iij
Otto rosæ . . . . . gtt. viij
Olei caryophylli . . gtt. vj. M.

Dentifrice.

℞ Pulv. cinchonæ flav. . ℥iij
Cretæ prep. . . . . ℥iij
Sacchari albi . . . . ℥j
Pulv. cinnamomi . . ℥j
Pulv. saponis cas. albi. ℥ij
Pulv. myrrhæ . . . ℥j. M.

For Mercurial Stomatitis.

DR. GARRETSON.

℞ Tinct. cinchonæ . . . ℥ij
Potassæ chloratis . . ℥ss
Sodæ bibor. . . . . ℥ij
Aluminis pulv. . . . ℥ij
Potassæ permanganatis gr.xxv
Aquæ coloniæ . . . ℥j
Tinct. myrrhæ . . . ℥j
Tinct. capsici . . . ℥j
Tinct. krameriæ . . . ℥j
Aquæ . . . . . ℥viij. M.

SIGNA.—Use as a gargle.

Dentifrice.

℞ Pulv. cinchonæ flav. . ℔b.ss
Cretæ prep. . . . . ℔b.ss
Pulv. myrrhæ . . . ℥iv
Pulv. radicis iridis . ℥iv. M.

For Ulcerations of Gums.

℞ Pulv. cinchonæ . . . ℥ij
Cupri sulph. . . . . gr.x
Acaciæ (pulv.) . . . ℥j
Mellis . . . . . ℥ij
Aquæ puræ . . . . . ℥iij. M.

SIGNA.—Apply with a camel's-hair brush to ulcerated surface of mucous membrane.

For a Wash after the Extraction of Teeth.

℞ Cinchonæ (decoct.) . f℥ij
Aluminæ . . . . . ℥ij
Infus. rosæ . . . . . f℥ij. M.

SIGNA.—Use as a gargle.

For Digestive Stimulation in Pyorrhœa Alveolaris.

DR. CHAS. B. ATKINSON.

℞ Cinchonidinæ sulph. . ℥ss
Acid. sulph. arom. . . ℥ij
Alcohol (95 per cent.) ℥iij
Aquæ dest. q. s. ad. ℥xv. M.

SIGNA.—One teaspoonful ter die.

CINNAMOMUM—CINNAMON.

CASSIA BARK.

Source.—The best variety of cinnamon is obtained from Ceylon, and is the prepared bark of a tree of the natural order *Lauraceæ*.

It is in the form of long, cylindrical pieces, thin, smooth, and of a yellow-brown color, with a fragrant odor, and a warm, sweetish, aromatic and slightly astringent taste. It contains a volatile oil, a slight amount of tannic acid, an acid peculiar to itself, *cinnamic acid*, mucilage, lignin, etc.

Medical Properties and Action.—Cinnamon is an aromatic stimulant and astringent, being more powerful as a local than as a general stimulant. Its medicinal virtues principally reside in a volatile oil, oleum cinnamomi.

Therapeutic Uses.—Cinnamon is chiefly used as an adjunct to other medicines, being seldom prescribed alone, though it is capable of allaying nausea and vomiting, and also relieving flatulence. Combined with chalk and with other astringents, it is well adapted for the treatment of diarrhœa. A strong decoction of cinnamon made by boiling one pound of the Ceylon sticks in a closed vessel for eight hours in three pints of water until the quantity is reduced to one pint, is recommended by Dr. Carne Ross for the pain of cancer. Dose is one-half pint taken during the 24 hours soon after meals.

Dose.—Of cinnamon, gr. x to ℥ss of the powder; of the tincture, the dose is f℥j to f℥iij.

Oil of Cinnamon—*Oleum Cinnamomi*—is obtained by distillation, and when fresh, is of a light yellow color, which becomes deeper by age, and ultimately red. It has an excessively hot, pungent taste. It is often employed to conceal the taste of other medicines, and is a powerful local stimulant. Large doses of the oil of cinnamon are poisonous, producing an inflamed and corroded condition of the gastric and intestinal mucous membrane. Oil of cinnamon is soluble in 1 part of alcohol, the solution being slightly acid.

Dose.—Of the oil of cinnamon, gtt. j or gtt. ij, administered in the form of an emulsion.

Oil of Cassia.—The oil of cassia is prepared from the same order of tree *Lauraceæ.*—Laurel, but not from the same tree as the oil of cinnamon, as the cassia is a distinct species from the true cinnamon. Oil of cassia is secured from the bud, bark, stem, and leaves. (See Essential Oils, also Antiseptics in Dental Practice.)

Cinnamon water—*Aqua Cinnamomi*—(cinnamon, carbonate of

magnesia and distilled water), is used as a vehicle for other medicines.

Spirit of cinnamon—*Spiritus Cinnamomi*—(oil of cinnamon, 1 part, stronger alcohol 15 parts). Dose, gtt. x to gtt. xx.

Dental Uses.—Cinnamon, in the form of powder, is employed as an ingredient of dentifrices, for its stimulant, astringent and aromatic properties. Oil of cinnamon is also employed as an ingredient of dentifrices, for its stimulant, astringent antiseptic, and aromatic properties, and for the relief of odontalgia. One drop applied to an inflamed dental pulp will afford temporary relief; it is also used, combined with iodoform, in the treatment of alveolar pyorrhœa. M. Chamberland asserts that no living germ of disease can resist the antiseptic power of essence of cinnamon for more than a few hours. It is said to destroy microbes as effectively, if not as rapidly, as corrosive sublimate. The oil of cassia is antiseptic and penetrating, with an agreeable odor, and with one part of carbolic acid, three parts of oil of gaultheria to two parts of the oil of cassia, forms a valuable antiseptic solution known as the 1. 2. 3. mixture.

DENTAL FORMULÆ.

For Alveolar Pyorrhœa.

DR. A. W. HARLAN.

℞ Oil of cassia . . . . ♏xij
Distilled water . . . ℥xvj

Agitate from time to time for a few days at a temperature of 70° F., or upward, and to each ounce of the above add:

Officinal dilute sulphuric acid ♏v. Mix.

SIGNA.—After injecting peroxide of sodium, inject the above slowly.

For Alveolar Pyorrhœa, Abscess, Etc.

DR. BLACK'S 1. 2. 3. MIXTURE.

℞ Oil of cinnamon . . 1 part
Carbolic acid (cryst.) 2 parts
Oil of gaultheria . . 3 parts. M.

To Sterilize Softened Dentine over a Nearly Exposed Pulp.

DR. H. A. SMITH.

℞ Oil of cassia . . . . 2 parts
Carbolic acid . . . 1 part
Oil of cloves . . . . 3 parts. M.

Insert permanent filling at once.

COCAINE.

Source.—Cocaine is the alkaloid obtained from the leaves of the *Erythroxylon Coca*, a shrub indigenous to certain parts of South America, as Peru and Chili. The leaves resemble those of Chinese tea, and in the preparation of the alkaloid it is neces-

sary that they should be of the best quality, which depends upon their being gathered at a proper time, carefully dried and not injured by age or by exposure to the air, as moisture deprives them of all value. Erythroxylon Coca is different from chocolate or Theobroma Cacao. Pure cocaine is in the form of transparent prisms, without smell, bitter to the taste. The hydrochlorate of cocaine is soluble in 0.48 part of water, and 3.5 parts of alcohol, while cocaine is only soluble in 704 parts of water, and is entirely soluble in ether. The solution has an alkaline reaction, and, when applied to the tongue, it imparts a bitter taste, and a certain insensibility, followed by a slight sensation of cold, recalling the effect of ether spray upon the epidermis. Heated to 208° F., the cocaine becomes liquid, and under the influence of cold, it becomes a transparent mass, which gradually assumes a crystalline form. If it be exposed to a higher heat than 208° F., cocaine changes its color and decomposes. It is inflammable, and burns with a brilliant flame, leaving an ash. It forms soluble salts with acids (its hydrochlorate is one of the best), and all these salts are more bitter than the alkaloid. It is a compound of carbon, hydrogen, nitrogen and oxygen. The chemical composition of the alkaloid is $C_{17}H_{21}NO_4$; its reaction is strongly alkaline.

The hydrochlorate of cocaine is generally employed in surgery, and is in the form of a white crystalline powder, which is sparingly soluble in water, but readily soluble in alcohol, ether, oil and vaseline. At first a 2 per cent. solution was used, but subsequently it was increased to four and more; at present 1 to 4 per cent. solutions are employed.

The solutions of cocaine are not stable beyond a few days, and hence have to be renewed frequently, or some antiseptic added, such as boric acid 2 1/2 per cent. or 2 1/2 per cent of carbolic acid; the solutions are injured by boiling.

Medical Properties and Physiological Action.—Dr. Niemann, of Goslar, as early as 1860, noted the fact that cocaine, when applied to the tongue, produced local anæsthesia, but his investigations, as well as those of others at a later period, appear to have been forgotten, until 1884 when Dr. Koller, of Vienna, demonstrated the action of cocaine, in solution, on the eye.

Locally applied to the mucous membrane, cocaine acts as an

anæsthetic, the blanching of the membrane being followed by marked congestion. When locally applied to sensory nerves, cocaine has a depressing effect. It has a powerful action on the eye on account of the delicacy of the conjunctiva, which it readily penetrates, and thus paralyzes the peripheral nerve-endings. The anæsthesia is produced in from one to five minutes according to the strength of the solution used, and is accompanied by marked dilatation of the pupil. Applied to the peripheral sensory nerves it paralyzes them; its action is manifested first upon the sensitive fibres and then upon the motor fibres. Poisonous doses of cocaine cause convulsions of cerebral origin, both clonic and tetanic. Taken internally cocaine stimulates the muscles, increasing muscular power temporarily, especially after starvation or fatigue. It acts as a stimulant to the heart and circulation in moderate doses, and also as a powerful respiratory stimulant, and in poisonous doses it destroys life by failure of the respiration with exhaustion from the convulsions. Cocaine increases the bodily temperature if given in large doses, due to an increase of heat-production; but in moderate doses it has no such effect. When taken into the stomach, cocaine diminishes its sensibility and impairs digestion. It is classed as a protoplasmic poison on account of its injurious effects upon the tissues. It is necessary to guard against its habitual use, as its effects from such a habit are disastrous.

Cocaine is eliminated by the kidneys, but is chiefly dissipated by oxidation in the body.

Therapeutic Uses.—Cocaine is an efficient local anæsthetic in all cases where it can come in contact with the nerve filaments in sufficient concentration. It is also employed in some forms of insanity, melancholia, neurastheia, gastralgia and in wasting diseases, pruritic skin affections and hoarseness. The leaves in cigarettes have relieved hay fever and throat affections. Cocaine is employed as a local anæsthetic and local anodyne in all painful affections of the eye, the operation for cataract, etc., but the evidence as to its reliability in such deep operations as iridectomy, squint, etc., is conflicting. (There are, however, cases reported by Dr. Konigstein of even the surfaces of the eyelids entirely losing their sensitiveness when hydrochlorate of cocaine was applied in solid form.) It is also employed in painful affections of

the pharynx and larynx, or of any other excitable mucous membrane or of nerve tissue. Prof. Engle reports a case of trigeminal neuralgia successfully treated by hypodermic injections of the hydrochlorate of cocaine. Dr. Wagner, of Vienna, basing a theory upon the established principle that fluids move from the positive to the negative pole in a galvanic current, saturated the positive electrode with a strong cocaine solution, applied it to the skin and applied the negative pole a short distance from the positive, and found that incisions could be made without producing any pain. (See Cataphoresis.)

Cocaine is locally applied in stomatitis before cauterizing the affected area of membrane, also in soreness and tenderness of the gums, in pharyngitis, and in coryza and hay fever, in the form of a powder combined with morphine and bismuth, which is snuffed into the nostrils; also in minor surgery, such as amputation of the fingers, etc., etc. Schleich's *infiltration anæsthesia* consists in injecting into the skin, as superficially as possible, a solution of common salt, cocaine, and morphine to produce local anæsthesia, and thereby pressure on the nerve-filaments, which are also depressed by the cold liquid coming in contact with them; and the local anemia so caused assists in destroying sensation. Whereas cocaine is soluble in fats, its salts are not, hence cocaine itself should only be used in anæsthetic salves or ointments. Internally administered, cocaine or the fluid extract of coca is of service in low fevers as a supportive and stimulant; in the vomiting of pregnancy, and other forms of severe emesis, as it depresses the gastric sensory nerves, thus decreasing the irritability of the stomach. It is also employed for the opium habit, but if given largely may induce the cocaine habit. The cocaine habit is more liable to occur among patients who are informed of the nature of the remedy used and especially is this the case when it is employed internally for medicinal purposes. Individual susceptibility to the toxic influence of cocaine is a complication of sufficiently frequent occurrence to surround the use of the drug with due care and caution; but it is not a contra-indication to its employment as an anæsthetic.

Dose.—The dose of the fluid extract (*Extractum Cocæ Fluidum*), is from 1/2 to 2 drachms. The dose of Cocaine is from 1/4 to 1/2 grain. The dose of the Hydrochlorate of Cocaine is 1/6 to 1/2

grain. In 25 minims of a four per cent. solution there is one grain of cocaine; 25 x 4 = 100. = 1.00 = 1 grain. The strength of cocaine solutions is from 1 to 4 per cent.; a 2 per cent. solution will generally answer the purpose, and of this solution twelve and one-half minims contain 1/4 grain of cocaine. For a topical application to the oral mucous membrane or when cocaine is used by the cataphoric method a stronger solution is required. For hypodermic injection the dose should not be more than 1/4 grain.

A point of considerable importance in using cocaine hypodermically is to make use of a perfectly aseptic syringe (see Hypodermic Method); for frequently in cases where the drug is so used and suppuration follows, it is the fault of want of cleanliness in this particular, and not to the employment of the drug.

The quantity of cocaine required to produce anæsthesia varies with the operation and its extent; as a rule, for ordinary minor operations from 25 to 40 minims of a four per cent. solution are needed. The length of time necessary for the production of local anæsthesia or insensibility under cocaine varies from three to ten minutes.

McLogan's test for the subalkaloid or toxic principle of cocaine is as follows: Place in a six-inch test-tube one milligram of cocaine; fill the tube with sterilized water and add four milligrams of a 10 per cent. solution of ammonia carbonate and agitate with a glass rod for one minute. If the cocaine is chemically pure, it will separate from the solution in a floculent mass. The clearer the remaining liquor the purer the cocaine. If the cocaine is impure it will be impossible to separate the cocaine, and the solution will present an opal color.

Dental Uses.—In operations in the mouth, affecting the mucous membrane and the immediately subjacent tissues, the salts of cocaine have proved efficient for their local anæsthetic and anodyne effects. But for operations on deep-seated tissues, such as are involved in the extraction of teeth, the action of pure cocaine is not certain in its practicable benefits. Cocaine has, however, proven very efficient in relieving the pain of the surgical treatment of alveolar pyorrhœa, the extirpation of the pulps of teeth, and, in some cases, that of hypersensitive dentine. Ex-

posed pulps are rendered less painful after being treated with a five per cent. solution of cocaine, to which, in some cases, morphine has been added. In some cases also, it is claimed, highly inflamed pulps have been successfully capped, as an experiment, with a paste of cocaine and glycerine, although, as was foreseen, the anæsthetic did not arrest the course of the pulpitis. In treating hypersensitive dentine, the more sensitive the structure the stronger the solution of cocaine to be employed. The pure cocaine in the form of crystals, of the hydrochlorate or other salts, has proven efficient when applied to hypersensitive dentine. For the extirpation of pulps of teeth, it is recommended first to anæsthetize the pulps superficially, with a paste of cocaine and glycerine, and then to introduce, by means of a syringe, a twenty per cent. solution of cocaine directly on the exposed portion of the pulp, when it can be removed with a nerve extractor without causing any pain. (See Adrenalin). Dr. John S. Marshall, from his experiments with the pills of citrate of cocaine, found that under favorable circumstances, the citrate, in such a form, produces anæsthesia, when applied to sensitive dentine, in from five to ten minutes, and that the obtunding effect is of a duration sufficient for the preparation of the cavity. He was also able to extirpate the pulp of the tooth, after the citrate had been applied, in from three to twelve minutes. In using the citrate in the form of pills, one pill is introduced into the sensitive cavity, and, after being secured with a pledget of cotton, moistened in tepid water, is permitted to remain from five to twelve minutes. Dr. Marshall suggests the use of granules, containing one-sixteenth of a grain of pure citrate of cocaine, instead of pills containing glycerine and saccharine matters. A solution of the salts of cocaine has also been subcutaneously injected, with favorable results, for the relief of the pain resulting from periodontitis and hypercementosis; and Dr. Hillischer recommends the rubbing in of cocaine, either in substance or in concentrated solution, after the epithelium has been macerated with tincture of iodine, to promote absorption, and thus relieve the pain of chronic periodontitis; also the repeated application of the concentrated solution to relieve the ulcers of thrush, aphthæ, etc. In the surgical treatment of alveolar pyorrhœa, the pain may be relieved by first applying dilute alcohol to the gums,

by means of a camel's-hair brush, and then in the same manner, a ten per cent. solution of cocaine, repeating the application of the cocaine once or twice during the space of five minutes. The slowness of the action of cocaine is a great objection to its use as an anæsthetic.

The four per cent. or five per cent. solution applied to a tooth unprotected by a rubber dam (as the rubber prevents the anæsthetic action of the agent), for the space of twenty minutes, repeating the application if necessary, is recommended by Dr. Thompson. Dr. A. W. Harlan recommends a solution composed of cocaine hydrochlorate ten grains, in sulphuric ether, ninety minims, which is to be applied for four or five minutes, for the painless extirpation of an exposed pulp.

Dr. Harper recommends the following method for removing pulps of teeth by the use of crystals of cocaine: "Take a drop of the oil of cloves and add enough cocaine to make a thick paste and introduce it into the pulp, after having first put the rubber dam on the tooth; then with a broach slowly work it down; with a bur open up the opening slowly, and in ten or fifteen minutes the pulp may be removed from any of the anterior teeth." Where arsenic has been applied to the pulp and the patient returns with pain, relief will be obtained from the application of cocaine. Dr. V. MacDonalds suggests the following method of using the cocaine-adrenalin solution: To a 1 per cent. solution of cocaine hydrochloride add an equal quantity of a 1:10,000 solution of adrenalin chloride in normal salt solution. Such a solution contains 1/2 per cent. solution of cocaine with 1:20,000 of adrenalin, of a strength sufficient to produce perfect anæsthesia when from 10 to 15 minims are injected around a tooth, either in extraction or excavating a sensitive cavity. The gum is well bathed with an antiseptic solution over the area to be injected and the injection made slowly, the blanching of the gum affording some idea of the extent injected. It is advisable, he says, to avoid the periosteum, as sloughing or necrosis may result.

Herbst's Obtundent consists of a saturated solution of cocaine hydrochlorate in chemically pure sulphuric acid, to which sulphuric ether is added to the point of saturation, the excess of the ether floating upon the surface and evaporating. Several appli-

cations are necessary to produce anæsthetic effects, and seventy grains of cocaine hydrochlorate are required to saturate two drachms of the sulphuric acid.

Cocaine, owing to the unsatisfactory results which have attended its use as a topical application, is now generally applied by hypodermic injection, for the extraction of teeth. Owing to the necessity for introducing the agent deeply into the tissues, Dr. Walb's method is to inject a two per cent. solution of the hydrochlorate of cocaine hypodermically over the root of the tooth to be extracted, the injections being usually made on each side of the gum, above the root of the tooth, and as many as the number of teeth to be extracted may indicate; the same method is employed for obtunding hypersensitive dentine, and in removing pulps. The full anæsthetic effect is developed in from five to ten minutes, and continues ten or fifteen minutes. It has also been suggested to hypodermically inject the solutions of cocaine upon both the lingual branch and the inferior dental branch of the inferior maxillary nerve, the former being preferred by some, on account of its supplying the alveoli and gums; but greater success appears to result from injecting the gum on each side of the tooth. Dr. Raymond recommends charging the syringe with thirteen minims of a four per cent. solution of cocaine, and to direct the needle-point on a line extending about midway between the angle and the coronoid process of the inferior maxillary, passing through the internal pterygoid muscle, and, using the finger on the external oblique line as a guide, to carry the needle-point along inner surface of ramus until the nerve is reached, where it enters the inferior dental foramen, for operations on the inferior molar teeth.

Dr. Raymond also suggests the following method of preparing and applying cocaine: Obtain a quantity of the soluble alkaloid, and mix it at the time of using it (as it deteriorates when long kept). The requisites are a minim glass, pair of scales, some filtering paper, and a little water that has been boiled. It is necessary to have an easy-working syringe, with a perfectly smooth, sharp needle. Care must be taken to exhaust the air from the syringe when charged ready for use. This can be done by drawing in more of the solution than is needed, and pressing it out to the required number of minims. Hold the needle-point

up, so as to allow the air to get above the solution, then press the piston.

The needle of the hypodermic syringe should be fine, sharp and clean, and rendered thoroughly aseptic previous to its employment, which may be accomplished by drawing up through it a few drops of any good antiseptic solution, such as strong carbolic acid, and the solution should be freshly prepared for each operation as the salts of cocaine rapidly decompose; or the needle of the springe can be immersed in, and the barrel filled with, boiling water rendered alkaline by the addition of a small quantity of bicarbonate of soda. The salt should be dissolved in slightly warm water, and the strength of the solution vary from 1 to 4 per cent. A five per cent. solution is made by dissolving 1/2 grain of cocaine in 10 minims of water. Previous to the injection, the gum should be dried about the tooth, and a folded napkin so placed as to exclude the saliva. All air must be expelled from the syringe, and the gum at the point the needle of syringe is to enter, should be obtunded by applying a few drops of the solution to the mucous membrane, so as to render the puncture painless. It is recommended to inject the solution at three points, two punctures on the labial or buccal surface, and one on the palatine or lingual surface. The point of the needle should be inserted about one-sixth of an inch below the free margin of the gum, and pressed in obliquely, upwards or downwards, as the case may be, in a direction towards the apex of the tooth, until the point of the needle rests against the bone; all of the soft tissues must be penetrated. With the needle in position, and a finger placed on either side and pressed with some force against the gum to keep the tissues in place, the solution should be slowly injected, when the gum should appear completely blanched in the neighborhood of the puncture. After injecting the solution the needle should not be withdrawn for several seconds, and then a finger should be placed over the puncture to prevent any escape of the solution. Some six or seven minutes elapse before the full anæsthetic effects of the cocaine are obtained. Dr. Gask recommends placing a few crystals of the salt just around the neck of the tooth to render painless the application of the forceps, and he prefers for injection hydrochlorate of cocaine in the form of half-grain tabloids. Rinsing the

mouth with hot water before the injection of cocaine solution, and again afterwards, and repeating the injection, is a method which is attended with satisfactory results.

The best syringe for hypodermic uses consists of one made altogether of metal with no leather packing as this is unclean. The metal piston is accurately ground to fit the metal barrel, and the piston should be touched with glycerine before using the syringe, as this is easily washed off. Such a syringe can be boiled without the slightest injury, which should be done every time it is used.

The combined use of cocaine and chloroform is advocated by Obolinski, who injects, either before or after the anæsthesia is obtained, from one to three centigrammes of cocaine; or he injects in the neighborhood of the seat of operation, and during its progress, from three to seven centigrammes. Cocaine is thus used on the ground that it is a complete antagonist to chloroform, of which, however, there is some doubt, as cocaine is rather a general excitant of the central nervous gray matter than a direct and powerful stimulator of the heart, while its stimulant effect upon respiration is not to be depended upon. Obolinski claims that this mixed narcosis requires the use of less chloroform, that vomiting is prevented, and that there are few disagreeable after-effects. Dr. Gordon White recommends a saturated solution of cocaine hydrochlorate in ether as an excellent preparation for sensitive dentine and pulp-extirpation. (See Vapocaine.) A mixture of cocaine and guaiacol in crystalline form, made into a thick paste, is recommended for hypersensitive dentine.

Dr. A. C. Gask recommends painting the palate with a five per cent. solution of cocaine for obtaining impressions of mouths which exhibit great intolerance to the introduction of all impression materials; also a 20 per cent. solution applied to the mucous membrane on cotton, for service in wedging and separating teeth, in forcing silk, etc., up in high conical edges, in removing portions of overhanging gum, in lancing abscesses, in treating alveolar pyorrhœa, in extirpation of pulps, and in the treatment of teeth very sensitive from periodontitis; also in the form of a 1/4 grain compressed tabloid placed in the cavity, to relieve the pain following extraction.

Dr. Corning's method of spinal cocainization consists of

injecting a solution of cocaine (0.2 to 0.5 per cent. strength) into the spinal canal to induce analgesia; but as danger attends such a procedure, such a method is not popular, especially for dental operations.

Dangers of Cocaine.—The dangers from the use of cocaine are depression of the heart, vaso-motor and respiratory center, the arterial pressure being decidedly lessened and asphyxia produced. Certain persons possess an idiosyncrasy to cocaine, which cannot be foreseen or entirely guarded against; it exerts its toxic effects upon the nervous centres and, secondarily, the heart; its evil effects are most liable in neurotic subjects; the danger in cocaine poisoning is mainly from paralysis of the heart, syncope; special care is necessary in "weak heart" and organic heart disease; many regard its subcutaneous administration as dangerous, and that it should be avoided; the use of the strongest solutions is dangerous and unnecessary; that it may be well to precede its use by the administration of alcohol or other cardiac stimulant, as is done with chloroform.

Patients of a sanguine temperament and in good health are the most favorable subjects in the use of cocaine; while the nervous, hysterical, and those exhibiting great dread of the impending operation, as well as pregnant women, may be regarded as unfavorable subjects. Great care should also be taken to prevent even the weakest solution of cocaine from running down into the fauces, and restorative agents should always be at hand.

Cocaine appears to be absorbed with extraordinary rapidity, and the stronger the solution which is locally applied, the greater the danger of toxic symptoms. The rapidity of the absorption varies in the different tissues, absorption occurring most rapidly through the conjunctiva, then through the nose, larynx, mouth and ear. Cocaine first stimulates and afterwards depresses the central nervous system, but when poisonous symptoms occur the symptoms may be irregular. It depresses the brain as is shown by such symptoms as narcosis or convulsions; also the medulla oblongata and spinal cord, shown by failure of respiration and depression of vaso-motor and reflex activity, also the heart, bringing about a decided fall of arterial pressure. A four per cent. solution is sufficiently strong for most purposes, and is less dangerous than one of greater strength.

Treatment of Cocaine Poisoning.—The treatment of cocaine poisoning consists of immediate efforts to stimulate the respiration and circulation by the use of inhalations of the nitrite of amyl, and such restoratives as brandy, whisky, aromatic spirits of ammonia, strychnine, atropine, digitalis, caffeine, and ether or chloroform (when convulsions are present), or five minims of carbonate of ammonia by injection. The hot baths, hot drinks, and hot sinapisms over the heart, and friction are often serviceable; also artificial respiration. M. Elroy recommends flagellation with wet towels, massage, and artificial respiration, if asphyxia threatens; inhalations of chloroform against tetanization of the respiratory muscles; where there is great pallor to provoke vasodilatation, and to diminish the encumberment of the central circulation by the inhalation of amyl nitrite. If these means prove ineffectual and deglutition is is impossible, give hypodermic injections of caffeine and of sulphuric ether (15, 30, even 45 minims). M. Chouppe recommends in addition the hypodermic injections of morphine, but only in the very outset, and as large as from one-half to five-eighths of a grain. Caffeine, atropine and strychnine are the best agents for increasing arterial pressure by stimulation of both vaso-motor centres and the heart. Dose of caffeine, 1 to 5 grains; of sulphate of strychnine, 1/60 to 1/10 of a grain; of sulphate of atrophine 1/120 to 1/60 of a grain; of tincture of digitalis, hypodermically, f℥1/4.

Efforts should be made to moderate the reflex excitability of the nervous system, sustain the heart, and reestablish the equilibrium of the blood-pressure, by the use of water of ammonia and spirit of camphor by inhalation, and the internal administration of spirit of ether, spirit of ammonia, alcohol, brandy and whisky, in doses of ℥1/4 to 1, every ten or fifteen minutes. Artificial respiration should be employed when there is a feeble respiration; or by rhythmically stretching the sphincter ani, which is a powerful means, according to Long, of exciting respiration reflexly in resuscitation at intervals of 4 seconds. Such an effect as depression of the brain is shown by narcosis or convulsions; depression of the spinal cord by failure of respiration and vaso-motor and reflex activity; and depression of the heart by the impairment and loss of arterial pressure.

Cocaine is also employed in combination with arsenious acid for a pulp-devitalizing mixture. (See *Arsenious Acid.*) One grain of cocaine to one-eighth ounce of chloroform is employed for extirpating pulps without pain; it is also combined with adrenalin chloride for obtunding the dental pulp. (See Adrenalin.)

Cocaine Incompatibles.—When combined with nitrate of silver, decomposition of the hydrochlorate occurs with the formation of an insoluble chloride of silver, and a corresponding change in the cocaine. If calomel and hydrochlorate of cocaine are rubbed together, chemical reaction begins. Added to mercuric oxide, an irritating instead of an anæsthetic action is produced, due to the formation of oxychloride of mercury.

Test for Presence of Cocaine.—H. Carlton Smith gives the following simple test: "To a solution of cocaine was added a few drops of ferric chloride; the iron was reduced as usual; then the addition of a single drop of stannous chloride produced a white precipitate. This disappeared upon shaking, but one or two more drops of the chloride of tin reproduced it, and this time it was permanent."

VAPOCAINE consists of a fifteen per cent. solution of cocaine hydrochlorate in ethyl ether, and is employed as a dentinal anæsthetic. It is neutral to litmus paper and is the production of an ethereal solution of a cocaine salt. It is principally used as an obtundent for sensitive dentine, and it is claimed for it that as aqueous solutions of cocaine salts fail to penetrate the dentine, and the ethereal solution of cocaine alkaloid is deficient in anæsthetic property, an ethereal solution of a cocaine salt, besides possessing anæsthetic properties, will secure the maximum of anæsthesia with the use of a minimum amount of cocaine. Vapocaine possesses great penetrating power, which is due to the fact that the heat of the mouth vaporizes a portion of the ether, and drives the natural fluid of the tooth out of the tubuli, thus securing a rapid distribution of the remaining portion throughout the tooth structure. From this portion the ether is dissipated, leaving the cocaine salt distributed in minute subdivisions throughout the tubuli. The cocaine is then redissolved by the natural fluid of the tooth, securing a rapid and effective anæsthetic. By its use the natural moisture of the tooth is made

to act as a solvent for the cocaine, thus obviating the delay which occurs when a watery solution of cocaine is allowed to diffuse throughout the tooth. The following is the method for using vapocaine: Apply the rubber dam and dry the cavity with hot air before applying vapocaine. Then place a piece of dry absorbent cotton in the cavity and drop the vapocaine on this until thoroughly saturated. Leave this in from two to five minutes, keeping the cotton saturated until ready for operation. It is preferable to cover the cotton with a piece of rubber dam in order to prevent the too rapid evaporation of the ether. Repeated applications of the vapocaine are made after a portion of the decayed dentine is first removed, and during this operation, and the dentinal tubuli being free, the vapocaine permeates the entire tooth structure. It requires a few minutes to produce a good result. It acts quickly in some teeth, and slowly in others. It is supposed to penetrate the dentinal tubuli chiefly by thermal energy rather than by capillary attraction, the evaporation of the ether causing pressure, which drives the moisture out of the tubuli and forces the vapocaine in. The ether being evaporated by the heat of the mouth, a deposit of cocaine remains in the tubuli, and is then dissolved by the natural fluid of the tooth again filling the tubuli. (*See Codrenin.*)

DENTAL FORMULÆ.

To Make a Solution of Hydrochlorate of Cocaine. (4 per cent.)

℞ Cocaini hydrochloratis (cryst.) . . . . . gr. 18.228
Aquæ destillatæ . . . f℥j. M.

For Painless Extraction as a Local Anæsthetic.

Dr. Clyde Paine.

℞ Cocaine . . . . . gr.xv
Glycerine . . . . . ℥v
Nitroglycerine . . . gr.1/10
Atropia sulph. . . . gr.j
Carbolic acid . . . . gtt. iij. M.
Distilled water to make ℥ij.
Signa.—By injection hypodermically.

For Exposed Pulps.

℞ Cocaini hydrochloratis (cryst.) . . . . . gr. vj
Spiritus menthæ pip. . f℥j. M.
Signa.—Apply on a pledget of cotton.

For Local Anæsthesia.

Dr. H. J. McKellops.

℞ Mur. cocaini . . . . gr.iss
Spts. alcoholis . . . ℥j
Chloroformi . . . . ℥j. M.

For Neuralgia and Odontalgia.

℞ Cocaini hydrochloratis (cryst.) . . . . . gr.vj
Menthol . . . . . gr.xxx
Alcoholis q. s. ad. . . f℥j. M.

SIGNA.—Apply as a lotion, or on a pledget of cotton.

Chloroform or bromide of ethyl may be substituted for the alcohol.

To Make Oleate of Cocaine.

(5 per cent.)

℞ Cocaini (alkaloid) . . gr.2 1/2
Acidi oleic (pure) . . ♏xx
Olei amygdalæ . . . ♏xl
Dissolve the alkaloid in the oleic acid and add the almond oil.

For Pain of Difficult Dentition.

M. VIQUIER.

℞ Cocaini hydrochloratis gr.ij
Syrup simp. . . . . ℥ijss
Tinct. saffron . . . . gtt.x. M.
SIGNA.—Rub the painful gums freely during the day.

For Local Anæsthesia.

DR. J. M. LEWIS.

℞ Cocaini hydrochloratis . grs.viii
Chloralis hydrat . . . gr.v
Acidi carbolici . . . gtt.iij
Aquæ destil. . . . . f℥iij. M.
SIGNA.—Inject 2 or 3 drops into the gum at one time.

For Hypersensitive Dentine.

℞ Cocaini hydrochloratis (cryst.) . . . . . gr.x
Tragacanth, glyceritum q.s.
Form a mass.
SIGNA.—Insert a minute portion in cavity half an hour before operating.

For Neuralgia and Odontalgia.

℞ Cocaini hydrochloratis (cryst.) . . . . . gr.xv
Olei caryophylli . . f℥j. M.
SIGNA.—Apply as a lotion, or on a pledget of cotton.

Local Anæsthetic.

℞ Cocaini hydrate (4 per cent. solution) . . ℥iij
Carbolic acid . . . . gtt.v
Chloral hydrate . . . gr.v. M.
SIGNA.—Use hypodermically around tooth with care.

Local Anæsthetic for Extraction of Teeth.

DR. J. W. HOPE.

℞ Cocaini hydrochloratis 5 parts
Acidi carbolici . . . . 6 parts
Camphoræ (pine gum) 6 parts
Alcoholis (95 per cent.)
q. s. to make 120 parts M.
SIGNA.—Inject with a hypodermic syringe 1 to 3 minims deeply into inner and outer surfaces of gum. Apply over the gum absorbent cotton saturated with the solution. Wait 4 or 5 minutes.

Local Anæsthesia for Gums and Sensitive Dentine.

DR. MARTIN.

℞ Cocaini gr.3/4
Antipyrin . . . . . gr.vj
Aq. destil . . . . . ♏xvj. M.
Prof. J. E. Michael suggests 2 grains of acetanilid as a substitute for the antipyrin.

For Stomatitis and Difficult Teething of Children.

INTERNAT. KLIN. RUNDSCHAU.

1. Paint the gums with the following mixture:

℞ Cocaini mur. . . . . gr.iss
Sodii chlor. . . . . gr.xv
Glycerini,
Aquæ dest. . . . . āā ℥iiss

2. Spray a boracic acid solution on the inflamed parts.

3. To prevent spasms give internally:

℞ Potassii brom. . . . gr.xv
Syr. alth. . . . . ʒv
Salep. gummos . . . ʒj–ʒij. M.
Signa.—Teaspoonful every hour.

For Irritation of the Gums.

Dr. M. F. Besnier.

℞ Hydrochlorate of cocaine . . . . . gr. 5/6
Bromide of potassium gr.viiss
Distilled water,
Glycerine . . . . . āāɱcl. M.

For Hpyersensitive Dentine.

Dr. D. Genese.

℞ Cocaine hydrochlor. 4 per cent.
Carbolic acid . . . 50 per cent.
Benzoin gum . . . 50 per cent.

Local Anæsthetic.

Dr. N. S. Hoff.

℞ Cocaini gr.1/2
Morphinæ sulph. . . gr.1/8
Atropinæ sulph. . . . gr.1/200
Sterilized water . gtts. xxx. M.
Signa.—Inject hypodermically gtts. v to xv.

Local Obtundent or Anæsthetic.

Dr. A. C. Hewitt.

℞ Cocaini hydrochlorat. grs.Cxx
Atropin gr.1/10
Strophanthin . . . gr.1/5
Beta naphthol . . . gr.x
Oil of cloves,
Oil of cassia . . . . āāʒij
Glycerine . . . . . adʒj. M.
Signa.—Apply for all operations about the gums, as with an applicator.

Local Anæsthetic.

Dr. W. T. Martin.

℞ Hydr. cocaini . . . grs.x
Sulph. atropin . . . gr.1/10
Aquæ dist.,
Listerine . . . . . āāʒiv. M.
Signa.—Inject into surrounding soft tissues, and wait 5 to 20 minutes.

Local Obtundent.

Dr. C. N. Peirce.

℞ Cocaine . . . . . gr.v
Carbolic acid . . . . grs.xx
Chloroform . . . . . ʒss
Muriatic acid . . . . ɱx
Alcohol . . . . . ʒij. M

Local Obtundent for Exposed Pulps, etc.

Dr. Bethel.

℞ Carbolic acid (crystals) grs.x
Gum camphor . . . grs.viij
Iodoform . . . . . grs.v

Local Obtundent for Exposed Pulps, Sensitive Dentine, and about Necks of Teeth.

℞ Acid, carbolic . . . gr.xx
Ol. sassafras . . . . ɱxxx
Oleate cocaine (4 per cent.) . . . . . ɱxv

Local Anæsthetic.

Dr. C. V. Snelgrove.

℞ Cocaini hydrochlorate gr.v
Acid, carbolic . . . gr.iv
Gum camphor . . . gr.vj
Glycerine, pure . . . gr.xv
95 per cent. spts. vini rect. q. s. ad. . . . ʒij

For Nausea from Wearing Plates.

℞ Cocaine . . . . . grs.viij
Syrup tolu . . . . . ℥ss
Whiskey . . . . . ℥iij
Water . . . . . Oj. M.
SIGNA.—To spray mouth.

Local Anæsthetic.

DR. I. P. BUCKLEY.

℞ Cocain hydrochlorid . gr.v
Sodium chlorid . . . gr.iv
Sterile water . . . . ℥j

To each syringeful (30 minims) add one drop of adrenalin chloride solution when used.

Schleich's Local Anæsthetic.

℞ Cocaine hydrochl. . . gr.1/5
Morphinæ hydrochl. . gr.1/40
Sodii chlorid gr.1/5
Dissolve in ♏ 100 of distilled water.

COCAINUM PHENYLICUM consists of a combination of cocaine and phenyl, the univalent radical, C_6H_5 of phenol. It is a light colored substance resembling and of the consistence of thick honey. It melts readily, dissolves in alcohol 30 to 50 per cent. and contains 75 per cent. of the alkaloid cocaine. It is used locally in a strength of one-tenth per cent., and appears to possess the same qualities as carbolic acid. It has been recommended in the place of muriate of cocaine.

COLCHICUM—MEADOW SAFFRON.

Source.—Colchicum root—*Colchici radix;* Colchicum seed—*Colchici semen,* the bulb and seed of the *Colchicum Autumnali.* Colchicum contains tannic and gallic acids and an alkaloid known as *colchicine,* which is the active principle; colchicum also contains starch, sugar and gum. It has a bitter taste, and imparts its medicinal virtues to water, alcohol, ether; wine and vinegar extract all its properties.

Medical Properties and Therapeutic Uses.—Colchicum is a vegetable alterative and in the forms of fluid extract, wine and tincture, increases the mucous and glandular secretions of the stomach, intestines, liver, kidneys and skin, and causes an increased flow of saliva , and also of urine. A large dose may produce heat in the epigastrium, nausea, vomiting, depression of the circulation, muscular feebleness and pain in the head, large watery stools and an increased secretion of biliary matters. In poisonous doses it produces all the symptoms of an irritant poison, such as acute pain in abdomen, profuse watery and mu-

cous discharges, suppression of urine, cold extremities and feeble pulse; also muscular cramps, in some cases. Colchicum is principally employed in gout, when a quantity sufficient to shorten the duration of an acute attack and reduce the swelling by an increased secretion from the skin, intestines and kidneys, is only required. It is often combined with an alkali, such as aromatic spirits of ammonia, bicarbonate of potassium, or carbonate of magnesia, to increase its effect. The active principle, *colchicine*, is generally more efficacious than the crude colchicum. It is very serviceable in rheumatic gout when combined with alkalies, and also in all affections dependent upon a gouty diathesis, such as constipation, congestion of the liver, and headache from torpor of the portal circulation. It is now rarely used in acute rheumatism, but in chronic rheumatism it often proves serviceable. Its use is indicated in plethora, constipation and deficient action of the liver, kidneys and skin.

Dose.—Of the fluid of colchicum root—*Extractum Colchici Radicis Fluidum*, ♏ij to ♏v. Of wine of colchicum root—*Vinum Colchici Radicis*, ♏v to ♏xxx. Of acetous extract of colchicum root—*Extractum Colchici Radicis*, gr. ss to gr. ij. Of tincture of colchicum (seed)—*Tinctura Colchici*, ♏x to ℥j.

COLLODIUM—COLLODION.

Derivation.—Collodion is a solution of gun cotton (pyroxylon) in ether and alcohol, 3 parts of pyroxylin, 75 parts of ether and 25 parts of alcohol. Pyroxylin or gun cotton is prepared by adding a mixture of nitric and sulphuric acids to cotton freed from impurities.

Collodion is a colorless, syrupy, and very inflammable liquid, or varnish with a strong ethereal odor. By long standing and exposure, or when applied to a surface, it deposits a thin, transparent and strongly contractile film, which is insoluble in water or alcohol; by the rapid evaporation of the ether and alcohol its volume contracts, and pressure is exerted upon the tissue it covers. It should be kept in glass-stoppered bottles. It is applied by means of a camel's-hair brush. When it becomes too thick, it may be diluted by a solution consisting of ether, 3 parts, alcohol, 1 part. Collodion is incompatible with carbolic acid.

Medical Properties and Action.—It is serviceable as an emollient, and its action is mechanical, as it draws together and holds in apposition divided parts, and protects such, as well as abraded or denuded surfaces, from contact with the air. As the ether it contains evaporates, the surface of the part to which it is applied is constringed, and a degree of pressure is thus established, which is very useful in moderating vascular action, promoting absorption, and changing the course of pus which may already be formed into a direction more desirable. On account of the liability of collodion to crack and peel off, these objections have been obviated by the use of what is known as FLEXIBLE COLLODION—*Collodium Flexile*—(collodion, 92 parts, Canada turpentine, 5 parts, castor oil, 3 parts), which is softer and more pliable and elastic.

Therapeutic Uses.—Collodion is very useful in ulcers, fissures, incised wounds, abraded surfaces, erysipelas, skin diseases, etc.

Dental Uses.—Collodion is a very useful application in dental practice, to prevent alveolar abscesses from discharging externally on the face; for such a purpose, it is applied in successive layers, so as to act as a compress, and, by moderating the vascular action, cause absorption, or such a change in the direction of the discharge as will induce it to open in the mouth. It is also employed in combination with carbolic acid, as an application for odontalgia; when introduced on cotton, it acts as a temporary filling; it has also been employed for arresting the mucous secretion during the operation of filling cavities near to or under the margin of the gum, but the rubber dam has superseded it in this respect. Combined with iron and other agents, it forms a styptic preparation.

In the dental laboratory, collodion, in the form of a colored preparation, is employed to coat the surfaces of the plaster models of plastic work, and when not applied too thick, it protects the plaster surface, and also prevents an unsightly rubber surface on that part of the plate which is adapted to the mucous surface of the mouth. When this preparation becomes too thick for use, it may be diluted with a solution of 3 parts of ether to 1 part of alcohol.

Collodion is precipitated by carbolic acid.

CANTHARIDAL COLLODION—*Collodium cum Cantharide*—is com-

posed of cantharides (Spanish flies), in powder 60 parts, flexible collodion, 85 parts, commercial chloroform, q. s. The addition of one per cent. of Venice turpentine to cantharidal collodion will prevent the disagreeable, and, at times, painful contraction of the preparation on drying.

Like cantharides, cantharidal collodion, when locally applied, excites inflammation of the skin and mucous membrane, which terminates in a copious secretion of serum under the cuticle. It produces a blister in the same time as an ordinary blistering plaster, and is applied with greater facility, and is better adapted to cover uneven surfaces, and retains its place more certainly. It acts much more readily if the evaporation of the ether is prevented by a piece of oiled silk placed over the surface immediately after the application of the collodion.

Dental Uses.—Cantharidal collodion is a valuable application in periodontitis, applied to the gum over the root of the affected tooth, by means of a camel's-hair brush, previously removing all moisture from the surface, and protecting the lips and cheeks, until the ether it contains has evaporated, and an artificial cuticle is formed. The blister which rises on the gum should be punctured with a needle. The counter-irritation thus produced relieves the periosteal inflammation.

Iodized Collodion—*Collodium Iodicum*—(collodion, ℥j, iodine gr. xx) forms a good solution of iodine for external use.

Styptic Collodion.—*Collodium Stypticum*—contains 20 per cent. of tannic acid.

DENTAL FORMULÆ.

For Odontalgia.

℞ Acidi carbolici cryst.,
Collodii . . . . āā ℥j. M.
Signa.—To be applied on cotton.

For a Styptic.

℞ Collodii . . . . partes 100
Acidi carbolici . partes 10
Acidi tannici . . partes 5
Acidi benzoici . partes 5 M.
Signa.—To be applied to the bleeding surface by means of a camel's-hair brush.

For a Styptic.

℞ Collodii . . . . . ℥iij
Tinct. ferri perchloridi ℥j
Olei ricini . . . . . gtt.ij. M.
Signa.—To be applied to the bleeding surface or, on cotton, to the alveolar cavity.

For a Styptic.

℞ Acidi tannici,
Alcoholis,
Ætheris . . . āā parts æq. M.
Then add as much pyroxylin as the solution will dissolve.

CRYSTALLIN is the name of a collodion, in which methyl alcohol takes the place of ethyl alcohol. Crystallin differs from ordinary collodion in that it does not dry so quickly: it leaves a thin transparent cuticle, and a pure article of methyl alcohol should be employed in preparing it to prevent the unpleasant, penetrating odor of impure alcohol. Philip recommends the following formula for "*flexible crystallin.*"

℞ Castor oil . . . . . 4 parts
Canada balsam . . . . . 2 parts
Crystallin . . . . . 40 parts.

Crystallin varnish, impervious to air, can be prepared as follows:

℞ Crystallin . . . . . 30 parts
Castor oil . . . . . 4 parts
Zinc oxide . . . . . 8 parts.

CONIUM—HEMLOCK.

Derivation.—Hemlock is the fruit of the *Conium Maculatum*, or spotted (not the common) hemlock, which is an umbelliferous plant. The principal one of its three alkaloids is conine, $C_8H_{15}N$, which is very powerful.

Medical Properties and Action.—Conium is a depressing agent producing motor paralysis, first causing, as the effects of a large dose, nausea and vomiting with a general weakness of the voluntary muscles, but with no direct action on the heart. In fatal cases of poisoning death follows from paralysis of the respiratory muscles causing asphyxia. The antidotes are nux vomica, picrotoxin, and active muscular exercise. It is quickly decomposed by heat.

Therapeutic Uses.—Conium is employed in mania, chorea, tetanus, hydrophobia, whooping-cough, asthma, laryngismus, stridulus, diseases of the eye and strychnine poison. For nerve-pain with muscular spasm, the best results may be expected from the combined administration of morphine and conine, subcutaneously applied, as the effects of conine are greatly heightened by morphine. Conium is also used in dislocations to relax muscles.

Dose.—Of Abstractum conii, gr. ss to gr. ij; Extractum conii alcoholicum, gr. ij to gr. iv; Extractum conii fluidum, ♏ij to ♏v; Tinctura conii, ♏x to f℥j; Conine, ♏ 1/10 to ♏ij.

Dental Uses.—Conium is employed in neuralgia, locally applied; inflamed dental pulps; also in cases of artificial teeth lodging in the œsophagus, to produce relaxation of the muscles

CREASOTUM—CREASOTE.

Specific Gravity: 1.08.

Derivation.—Creasote is a product of the distillation of wood-tar, and is a mixture of several phenols, such as carbolic acid, creasol, $C_8H_{10}O_2$, and cresylol, C_7H_8O. Its name is derived from the Greek κρεας, "flesh," and σωτης, "preserver," as animal substances, when saturated with it, are preserved from putrefaction. It is also obtained from crude pyroligneous acid. When derived from wood-tar, creasote principally consists of such phenols as *guaiacol*, *creasol*, methyl-creasol, and phloral. The best form of creasote for medical use is made from beech-wood.

Creasote, when fresh and pure, is a colorless, oleaginous fluid, with a strong empyreumatic odor, resembling closely carbolic acid, and a caustic, burning taste; when made from beech-wood creasote is of a reddish, amber color. After exposure, it has a yellowish or brownish tinge. Its purity may be tested by strong acetic acid, which dissolves the creasote, and leaves behind the impurities floating above the creasote solution. It may also be tested by dropping it on paper, when, if pure, it will, after being volatilized by heat, leave no stain. It coagulates egg albumen, but more slowly than carbolic acid. Creasote is soluble in 150 parts of water, and more freely soluble in absolute ether, chloroform, and oils. Creasote may be distinguished from carbolic acid, which it closely resembles in many respects, in being less caustic, and by not imparting a blue color to a piece of pine wood dipped first into an alkaline solution of creasote, and then, after drying, into muriatic acid; also by carbolic acid being crystallizable, while creasote is always liquid; by carbolic acid being soluble in glycerine, while creasote is insoluble in glycerine; and also by carbolic acid being soluble in about 20 parts of water, while

creasote is only soluble in about 150 parts of water; the odor of creasote is more like that of smoke than is the case with the odor of carbolic acid.

Combined with the tincture of the chloride of iron, an alcoholic solution of creasote will develop a deep, greenish-blue color, while carbolic acid with the same tincture produces a light brown. According to the U. S. Dispensatory, creasote powerfully coagulates albumen.

Medical Properties and Action.—Creasote is stimulant, sedative, rubefacient, escharotic, styptic and antiseptic. It possesses the property of immediately coagulating albumen, and to this property is ascribed many of its effects on the living system. In large doses it is an acro-narcotic poison; but in small doses, it is styptic and astringent, and for the latter property it is more generally administered than for any other. When creasote comes in contact with the blood, the latter changes from a bright red to a reddish-brown color, with small spots of coagulated albumen and it also becomes thicker. Applied to the tongue, it causes severe pain, but without redness of tumefaction; it also causes a strong taste of smoke, and a copious flow of saliva. When administered internally in small doses, it causes a sensation of warmth in the stomach, and exercises a decided sedative action and is antiseptic. In large and poisonous doses it produces profound stupor, flushed countenance, fixed eyes, slow and labored pulse, irritable stomach, nausea, vertigo, but has no effect, such as dilatation or contraction, on the pupils. The treatment in cases of poisoning by creasote consists in administering albumen, such as white of eggs, milk or wheat flour; also the administration of ammonia and other stimulants, mustard, emetics, etc. Death from creasote is caused by its coagulating the albumen of the blood, and preventing its circulation through the arterial system.

Therapeutic Uses.—Creasote is administered internally for gastric irritability and vomiting, flatulence, diarrhœa, diabetes, hemoptysis, pulmonary consumption, chronic bronchitis, epilepsy, neuralgia, etc. Externally, it is applied to ulcers, eruptions, diseases of the skin, wounds, hemorrhage from wounds or leech bites, warts; also in putrid sore throat, as a gargle.

Dose.—Of creasote, gtt. j or gtt. ij, several times a day, either

in mucilage, in the proportion of half a fluid ounce to a drop of the creasote; or it may be given in pill form. For external use, from gtt. ij to gtt. vj, or more may be added to a fluid ounce of water.

Creasote Water.—*Aqua Creasoti* (creasote, ℥j, distilled water, Oj). Dose of creasote water, f℥j to f℥iv.

Solidified Creasote.—For the purpose of making the application of creasote to the teeth more convenient, and preventing the effects upon the mucous membrane of the mouth when applying it to carious cavities in teeth, a gelatinous solidity may be given to it by adding 10 parts of collodion to 15 parts of creasote.

Dental Uses.—Creasote, like carbolic acid, is a valuable agent in dental practice, although the use of the latter has, in some respects, superseded that of the former, the two being very similar in their action, with some advantages in the case of carbolic acid. Creasote in a saturated aqueous solution of 2/3 per cent. is used as a mouth-wash; it is also employed for the relief of odontalgia, obtunding the sensitiveness of dentine, alveolar abscess, periodontitis, suppurating pulps of teeth, devitalizing pulps of teeth, treatment of exposed pulps of teeth, mercurial, and other forms of stomatitis, ulcers of the mouth, diseases of the gums; as a styptic for hemorrhage from the gums, mucous membrane and leech bites, and after the extraction of teeth. Creasote, like carbolic acid, has a peculiar power as an antiseptic, hence it is a valuable application in cases attended with offensive purulent discharges. It promotes the growth of healthy granulations, and hastens the healing of wounds, and arrests the process of suppuration. Properly diluted in the form of a gargle, creasote in sloughs of the mouth or throat stimulates the ulcer to healing and corrects fetor of the breath. When applied to ulcerated surfaces, it should be repeated as pus is formed, or fungous growths appear. It is a painful escharotic upon mucous membrane, with, however, a soothing reaction.

For the treatment of exposed pulps it is employed either diluted or in its full strength; for periodontitis and alveolar abscess, in its full strength, or in combination with such agents as glycerine, iodine, etc.; also in devitalized teeth, and as an antiseptic application in ulceration of the mouth, and recession of gums from the necks of the teeth. When used as a styptic after the extrac-

tion of teeth it is applied on lint or cotton, with pressure; and diluted with water it is employed in the treatment of caries and necrosis of the maxillary bones. To dilute it for injections it is often mixed with alcohol, and the strength reduced by adding water. Mixed with an equal quantity of oil of cloves its odor and taste are modified. Creasote is also employed to neutralize any acid remaining in the cavity of a tooth about to be filled, and to harden and render imperishable the contents of the dentinal tubuli, for which purpose it is applied to the walls of the cavity on a pellet of cotton. Equal quantities by bulk of creasote and oil of cloves are applied to aching teeth, painful gums, ulcerous surfaces, and also where pulps are not exposed; also for saturating cavities before the insertion of fillings, as a disinfectant and coagulant.

An ointment—*Unguentum Creasoti*—is composed of creasote 10 parts, lard 90 parts, and is useful in cutaneous affections.

DENTAL FORMULÆ.

For Pulpitis.

DR. GARRETSON.

℞ Creasoti . . . . . gtt.vj
Tinct. iodinii . . . ʒj
Liq. plumb. subacetat. ʒj
Chloroformi,
Tinct. opii . . . . āā ʒss. M.

SIGNA.—Apply on cotton to exposed surface of pulp.

For Alveolar Abscesses.

℞ Creasoti,
Linimenti iodi, partes
æquales. M.

SIGNA.—To be used as an injection.

For Odontalgia.

℞ Creasoti . . . . . ʒss
Camphoræ . . . . . gr.x. M.

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

For Odontalgia.

℞ Creasoti . . . . . ʒij
Morphinæ acetatis . . gr.xx. M.

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

For Odontalgia.

℞ Creasoti,
Chloroformi,
Liquidi opii . . . āā ʒiij
Tinctura benzoini . ʒj. M.

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

For Odontalgia.

℞ Creasoti,
Chloroformi,
Morphinæ hydrochloratis . . . . . āā ʒiij
Tinctura benzoini . . . . . ʒj. M.

SIGNA.—To be applied, on a pellet of cotton, to carious cavity. (See formulæ of Carbolic Acid.)

GUAIACOL is a liquid obtained from wood creasote, in the form of an oily liquid with an odor of cassia and resorcin; it constitutes from 60 to 90 per cent. of creasote.

The liquid guaiacol found in commerce is far from being a chemically pure product. It is a mixture of cresylol, guaiacol and creasote in varying proportions. It may contain 50 per-cent. guaiacol, but sometimes it contains no more than 20 or even 10 per cent. Pure guaiacol is in the form of hard, white rhomboidal crystals, almost insoluble in water, but soluble in alcohol, in oil, and in anhydrous glycerine.

The taste of guaiacol is slightly sweetish, with a pungent and burning after-taste. The chief effects of poisoning with pure guaiacol are agitation and then enfeeblement with retardation of the heart's action, and of the breathing. Most of the secretions, and especially the lachrymal, are increased in quantity. Death occurs during coma. Synthetic guaiacol has been administered in various stages of consumption, taken immediately before eating. Large doses may cause vomiting.

The oily liquid possesses the active principle of creasote, and the power to destroy microbes in the human mouth. It is claimed to possess the same therapeutic value as creasote and to be a better disinfectant, especially in cases of decomposed pulps. "Guaiacol may be sealed up in a pulp cavity from one to three months or more, and the contents be found perfectly disinfected." Guaiacol has been used as a vehicle for cocaine in the cataphoric method of application.

CREOLIN—CREOLINE—KREOLIN.

CREOLIN is a liquid cresol, a product of the decomposition of coal tar.

Derivation.—It is obtained from English pit-coal by distillation, and is in the form of a brownish, syrupy liquid, complex and very impure, with an odor like tar; and in its impure state is slightly irritating, slightly caustic and strongly acid, and resembles in its properties the phenols. A purified preparation of creolin is, however, as neutral as vaseline, and quite as inoffensive to man and animals. It is slightly soluble in water, but soluble in ether, chloroform, and absolute alcohol; in the form

of an emulsion it is as efficacious as an antiseptic as a true solution.

Therapeutic Uses and Medical Properties.—Creolin is both antiseptic, germicide and hemostatic, being employed for the latter purpose in obstetrical practice; it is also used in tonsillitis. It is employed with great benefit in ulcers of the cornea. Its germicidal power is somewhat below that of carbolic acid. Its antiseptic properties are powerful, and it is not irritating nor poisonous. It is soluble in alcohol and glycerine, and it does not affect the skin nor corrode instruments, and the odor of the purified preparation is not disagreeable. It appears to have an anodyne effect, and is curative when applied to open wounds. Creolin has also been employed in antral disease. An aqueous solution of creolin is made of: ℞. Creolin, gr. iss; aquæ destil., ♏cl, which may be applied with a brush or in the form of spray.

Dental Uses.—For dental use it may be injected, or applied on floss-silk or cotton wool. Creolin is considered to be a good deodorizer of iodoform. One or two drops of creolin may be added to half a glass of water for a mouth-wash, to correct disagreeable odors from the teeth and mouth. It will also hold in check acid-producing germs; it is also recommended for its action on mucous surfaces in soft and congested mouths, and to correct acid conditions, and in the treatment of fistulous tracts of suppurating surfaces; also in root canals to deodorize dead tissue. It will also remove the rust on instruments when applied by means of a felt wheel on a lathe. To sterilize instruments a two per cent. solution may be used; also on the hands, and a one per cent. solution for irrigation of wounds and treatment of mucous surfaces.

DENTAL FORMULA.

For Alveolar Pyorrhœa.

DR. A. W. HARLAN.

℞ Creolin	℥j	
Sodium fluo. silicate	gr.xx	
Olei cassiæ	♏xx	
Gylcerinæ	℥iv.	M.

Dilute with water to suit.

SIGNA.—Use as a mouth-wash on a soft brush, during the intervals between sittings when escharotic and antiseptic agents have been applied.

CRETA PRÆPARATA—PREPARED CHALK.

PRECIPITATED CHALK, CARBONATE OF LIME.

Formula.—$CaCO_3$.

Derivation.—Prepared chalk is obtained by freeing chalk from such impurities as gritty and flinty substances, and soluble saline matter, by elutriation, and afterward drying it. It is the only form in which chalk is used medicinally; and is in the form of powder or cone-shaped masses.

Medical Properties and Action.—Prepared chalk is antacid, absorbent and astringent. It diminishes the secretion of the mucous membrane, and at the same time acts as an antacid in correcting any acidity present. When internally administered for a considerable time, like magnesia, it accumulates in the bowels and forms intestinal concretions; hence an occasional aperient is necessary.

Therapeutic Uses.—Prepared chalk is an excellent antacid in diarrhœa from acidity, in acidity attending dyspepsia and gout, chronic bronchitis in advanced stages, rachitis, etc. Externally, it is employed in the treatment of ulcers, burns, excoriations and skin diseases. It moderately stimulates ulcers and absorbs the discharge, thus preventing them from spreading.

It is an antidote for poisoning by oxalic and most of the vegetable and mineral acids.

Dose.—Of prepared chalk, gr. v to ℈j, in powder or suspended in water by the aid of mucilage and sugar.

Chalk Mixture—*Mistura Cretæ*—(prepared chalk, ℥ss; acacia, gr. cxx; water, f℥iv) is often combined with opiates and astringents, such as laudanum and tincture of kino or of catechu, in the treatment of diarrhœa. Dose, ℥j to ℥ss.

Dental Uses.—Prepared chalk is used in dental practice chiefly for its antacid property, and generally as an ingredient basis of dentifrices; it is also employed in the form of powder as an antacid in acidity of the oral fluids, for which purpose it is rubbed between the teeth and permitted to remain during the night; it is also employed to obtund the sensitiveness of dentine, on account of its absorbent and antacid properties; for such a purpose it should be applied repeatedly, for several days, to the sensitive surface, notably on retiring, as little saliva is generated

during sleep. In the dental laboratory it is used as a polishing powder for metal and plastic work; also for polishing the surfaces of gold fillings. The precipitated chalk of the Pharmacopœia is the preparation to be preferred on account of its freedom from gritty particles.

DENTAL FORMULÆ.

Dentifrice in the form of Troches.

℞ Cretæ præparatæ . . ℔.iv
Sodii boratis (pulv.) ʒx
Saponis Castil (pulv.) ʒx
Sacch. albæ (pulv.) ℔.iss
Ossis sepiæ (pulv.) . . ℔.i 1/4
Olei rosæ . . . . . gtt.xxx
Millefleurs . . . . . ʒj
Essentiæ jasmin . . ʒ1/4

Mix with a solution of gum syrup.

Dentifrice in the form of Camphorated Paste.

KELLER MEDICINE CO.

	Pts. by Wt.
℞ Magnes. carb. . . .	2
Glycerini	1
Potas. chlorat. . . .	3
Tr. camphora . . .	1
Ol. gaultheriæ . . .	q.s.
Cretæ præp.	q.s.

To make desired number of parts.
Syr. simplic. . . . . q.s. M.
To make a thick paste.

Dentifrice.

AM. DENT. ASSOCIATION.

℞ Cretæ præparatæ. . . ℔iij
Pulv. cinchonæ . . . ℔j
Pulv. radicis iridis . ℔j
Pulv. sacchari albi . ℔iss
Pulv. saponis cas. . . ʒj
Sodi carb. . . . . ʒj
Olei sassafras . . . gtt.lxxx

Dentifrice.

AM. DENT. ASSOCIATION.

℞ Cretæ præp. . . . . ℔iij
Pulv. Cinchonæ . . . ℔j
Pulv. radicis iridis . ℔j
Pulv. sacchari albi . ℔iss
Pulv. saponis cas. . . ʒj
Sodii carb. . . . . ʒj
Glycerini . . . . . fʒiij
Mellis . . . . . q.s.

And form into a paste.

Dentifrice.

℞ Pulv. radicis iridis . ℔ss
Cretæ præparatæ . . ʒiv
Sodii carb. . . . . ʒss
Pulv. cinchonæ . . . ʒiv
Pulv. sacchari albi . ʒij
Pulv. myrrhæ . . . ʒj
Pulv. ossis sepiæ . . ʒij
Otto rosæ . . . . . gtt.iv.

With rose pink, q. s. to color.

Dentifrice in the form of Glycerine Tablets.

KELLER MEDICINE CO.

	Pts. by Wt.
℞ Solut. magnes. carb. .	2
Solut. sodii bicarb. .	1
Solut. potas. chlorat.	3
Solut. sapo. cas. albi	6
Glycerini	1
Cal. carb.	10
Ol. gaultheria,	
Cassiæ	āā q. s. M.

To flavor.

Dentifrice.

℞ Cretæ præp . . . . . ℥iij
Pulv. radicis iridis . . ℥ij
Pulv. sacchari albi . ℥j
Pulv. cinnamon . . ℥iij
Pulv. saponis cas. . . ℥ij
Pulv. myrrhæ . . . ℥j
Ol. gaultheriæ . . . gtt.x. M.

Dentifrice.

DR. A. W. HARLAN.

℞ Cretæ præparatæ,
Pulv. radicis iridis . . āā ℥ij
Pulv. saponis cas.,
Pulv. sodii biboratis āā ℥ss
Pulv. myrrhæ . . . ℥ij
Mellis et glycerini . q. s.
To make a soft paste.
Color rose pink. Perfume to suit.

Dentifrice.

DR. CHAPIN A. HARRIS.

℞ Cretæ præparatæ . . ℥iv
Pulv. radicis iridis . ℥iv
Pulv. cinnamon . . ℥iv
Sodii carbonatis exsiccatæ . . . . . ℥ss
Pulv. sacchari albi . ℥j
Olei limonis . . . . gtt.xv
Olei rosæ . . . . . gtt.ij

SIGNA.—Ingredients to be thoroughly pulverized and well mixed.

Dentifrice.

℞ Cretæ præparatæ . . ℔iss
Pulv. sodi boratis,
Pulv. radicis iridis . . āā ℔ss
Semen cardamom . ℥j
Pulv. sacchari albi . ℔ss
Otto rosæ . . . . . q.s. M.
To flavor.

Dentifrice.

DR. W. D. MILLER.

℞ Precipitated carbonate of calcium . . . . ℥iii 3/4
Cinchona bark . . . ℥xv
Prepared oyster shell ℥xv
Powd. myrrh . . . ℥vii 1/2
Powd. cloves . . . . ℥iij 3/4
Oil of cinnamon gtt. x to xv.
Mix well.

Dentifrice in the form of a Paste for Compressible Tubes.

KELLER MEDICINE CO.

	Pts. by Wt.
℞ Magnes carbonat. . .	2
Sodii bicarb.	3
Potas. chlorat. . . .	5
Calcii carbonat. . . .	20
Sapo. cas. pulv. . . .	6
Glycerini	1
Olei gaultheriæ,	
Olei limonis	āā q. s.
Syr. simplic.	q. s.

SIGNA.—To make a paste.

For Fetor of Breath.

MILLIRON.

℞ Sulphur. powd.,
Cretæ præp. pulv. . . āā ℥j
Spts. rectificatus . . ℥jss
Aquæ. distil. . . . . ℥iij
Peppermint . . . . q. s. M.
SIGNA.—After removal of all calcic deposits, use with a toothbrush morning and evening.

Dentifrice.

DR. DARBY.

℞ Cretæ præparatæ . . ℥viij
Pulv. radicis iridis . ℥iv
Pulv. ossis sepiæ . .
Pulv. sacchari albi .
Saponis castil. . . āā ℥j
Sodæ bicarb. . . . . ℥ss
Pulv. cinchonæ flava. ℥j
Cochineal . . . . . ℥j
Olei rosæ . . . gtt.xx. M.

Rose Dentifrice.

℞ Cretæ præparatæ . . ℥xv
Pulv. saponis . . . ℥j
Saccharin . . . . . gr.x
Thymolis . . . . . gr.xv
Camphoræ . . . . . gr.xxx
Vanillin . . . . . gr.v
Olei rosæ . . . . . gtt.vj. M.

Rub the camphor and thymol together in a mortar. and warm gently so as to render the mixture liquid; then add the chalk in small portions at a time, reserving about one ounce; next add the other ingredients, the perfumes being first separately rubbed with the remainder of the chalk.

Dentifrice, Antacid, Tonic and Antiseptic.

℞ Cretæ præparatæ . . ℥iv
Quininæ disulph. . . gr.iv
Pulv. ossis sepiæ . . ℥iv
Otto rosæ . . . . . gtt.iv. M.

Dentifrice.

Dr. A. W. Harlan.

℞ Cretæ præparatæ
Pulv. radicis iridis . āā℥iij
Resorcin . . . . . ℥j
Saccharine . . . . . gr.v
Pulv. ossis sepiæ . . . ℥j
Olei menthæ piperitæ. ♏v. M.

Signa.—Use on a brush moistened with tepid water.

Dentifrice.

Dr. A. W. Harlan.

℞ Cretæ præparatæ . . ℥iij
Sodium fluo. silicate ℥ss
Acidi tannici . . . . gr.xxx
Pulv. sacchari albi . ℥jss
Pulv. ossis sepiæ . . ℥ss
Olei gaultheriæ . . . ♏x. M.

To make a paste of the above add glycerine 2 parts and honey 1 part.

Cream Dentifrice.

Dental Office and Laboratory.

℞ Castile soap, in fine powder . . . . . 1/2 oz.
Prepared chalk . . . 1 oz.
Oil of rose geranium 8 drops.

Glycerine sufficient to determine its consistence.

Rose Dentifrice.

British Journal Dental Science.

℞ Precipitated chalk . ℥xij
Prepared chalk . . . ℥vj
Powdered orris . . . ℥vi
Essence of vanilla . ℥iij
Tincture coumarin . ℥vj
Tincture benzoin . . ℥iij
Ammonia (stronger) . ℥j
Carmine . . . . . ℥j
Oil of cloves . . . . ♏xij
Glycerine . . . . . ℥iij. M.

Or a sufficiency.

Dentifrice.

Cretæ præp. . . . . ℥jss
Pulv. radicis iridis . . . . ℥j
Pulv. sacchari. albi. . . . ℥ss
Pulv. cinnamon . . . . . ℥jss.
Pulv. saponis cas. . . . . ℥j
Pulv. myrrhæ . . . . . ℥ss
Ol. gaultheria . . . . . gtt. v.

Citroleine Dentifrice.

Dental Office and Laboratory.

℞ Precipitated chalk . . ℔j
Powdered sugar . . . ℥ij
Powdered orris root . ℥iv
Cuttle-fish bone . . . ℥ij
Bicarbonate of soda . ℥ij
Oil of lemon . . . . ℥ij. M.

Dentifrices may be pleasantly flavored with wintergreen, cassia, sassafras, lemon, peppermint, anise, lavender, pennyroyal, cloves, calamus, attar of roses, oil of neroli, oil of rose geranium, etc. Cochineal coloring in small quantity will impart a pink color to a dentifrice.

CROTON—CHLORAL HYDRAS.

HYDRATE OF BUTYL CHLORAL.

Formula.—$C_4H_5Cl_3O.H_2O$.

Derivation.—Croton-chloral Hydrate is obtained by the action of chlorine gas upon aldehyde. It is in the form of small, brilliant, white, silvery crystals of a sweetish taste, like that of melons. It is slightly soluble in water, and resembles hydrate of chloral in its hypnotic effects; but its action in this respect is not so powerful nor so certain. It differs from hydrate of chloral in the singular property of causing anæsthesia of the head. To relieve pain and induce sleep, the best effects are obtained from a combination of the two agents.

Medical Properties and Action.—It is a sedative, hypnotic and anæsthetic. It resembles chloral hydrate, but is not so certain in its effects as a hypnotic. Its action commences in the head and face.

Therapeutic Uses.—Croton-chloral hydrate is highly recommended in dysmenorrhœa, sciatica, chronic cough, and in neuralgia as an anodyne. One or two grains will relieve severe neuralgia of the fifth pair of nerves; it is frequently necessary, however, to administer from five to fifteen grains, but it is not safe to exceed this amount at one time. Croton chloral in five or ten grain doses, in pill form, administered three times a day, often relieves facial neuralgia. The dose should be diminished after two or three days to five grains or less as occasion demands.

Dose.—Of croton-chloral hydrate, gr. v to gr. x; as an anæsthetic, gr. xv, dissolved in warm water.

Dental Uses.—It is employed with effect in facial neuralgia, in doses of from two or five grains every hour or two, until fifteen grains have been taken; also as a sedative, in doses of from three to five grains, in periodontitis, pulpitis, etc., etc.

DENTAL FORMULÆ.

For Neuralgic Odontalgia.

VON KIRCHBAUER.

℞ Croton chloral . . . ʒj
Glycerini . . . . . ʒvj
Aquæ destill. . . . . ʒiiss
Syr. aurantii . . . . ʒiv
Oleum fœniculæ . . gtt.vj. M.

SIGNA.—A tablespoonful, and if pain continues severe, repeat the dose in an hour.

For Neuralgia.

DR. GLASSINGTON.

℞ Hydrate of butyl-chloral gr.v
Syrup of Tolu . . . ʒj
Spirit of chloroform ♏x
Aquæ . . . . . ʒjss. M.

SIGNA.—Dose to be repeated in one hour if relief is not obtained.

CUPRI SULPHAS—SULPHATE OF COPPER.

BLUE VITROL, BLUE STONE.

Formula.—$CuSO_4 + 5H_2O$.

Derivation.—Sulphate of copper is obtained by roasting the native sulphuret, or by the combination of oxide of copper and sulphuric acid, filtering and crystallizing. It is in the form of blue prismatic crystals which, after exposure to the air, effloresce to a slight degree, and become covered with a greenish-white powder. It has an astringent, metallic taste, and is soluble in 2.6 parts of water

Medical Properties and Action.—Sulphate of Copper is emetic, tonic, nervine, stimulant, antiseptic and astringent, and is quite soluble in water, but insoluble in alcohol. It is a prompt and efficient emetic, the emesis commencing a few minutes after it reaches the stomach, and the copper comes up with the vomited matter. Little or no depression follows its administration as an emetic, and it is especially adapted to cases of narcotic poisoning; it coagulates albumen.

Therapeutic Uses.—Sulphate of Copper is employed as a prompt and efficient emetic in cases of poisoning; it is also administered in intermittent fever, neuralgia, diarrhœa, dysentery, croup, epilepsy, hysteria, etc., etc. Externally it is applied in ulcerative and gangrenous affections, superficial hemorrhage, leucorrhœa, gonorrhœa, ringworm, purulent ophthalmia, mucous discharges, diseases of the skin, indolent ulcers, fungous granulations, warts, etc.

Dose.—Of sulphate of copper as an emetic, gr. iij to gr. v; or dissolve 20 grains in two ounces of distilled water and give a tablespoonful every 15 minutes until vomiting occurs. For internal use other than emetic the dose is gr. 1/6 to gr. ss in pill.

Dental Uses.—Sulphate of copper is employed in dental practice, in the form of the ammoniacal solution, for long-standing cases of neuralgia; and externally it is applied to ulcers of the mouth, cancrum oris, aphthous ulceration, ulceration of the gums and mucous membrane of the mouth, hemorrhage from leech bites, fungous growths of the gums, pyorrhœa pockets, etc., etc.

Dr. J. G. Templeton recommends powdered sulphate of copper, for suppurating teeth, applying it on a stick of wood which is wet and dipped in the powder, and thus can be thoroughly applied to the diseased parts; the mouth is then rinsed with tinct. of gaultheria or tinct. of krameria; it will stain tooth structure. Albumen is the antidote.

Cuprol.—Nucleide of Copper is a chemical combination of copper with nucleinic acid; it contains 6 per cent. of copper, and is in the form of a green powder readily soluble in water; it does not coagulate albumen and is not precipitated by alkalies. Cuprol is a substitute for sulphate of copper, and possesses its antiphlogistic. antiseptic and stimulant properties, with its disadvantages minimized; a 10 per cent. solution causes but slight pain and very little irritation to the tissues. It is useful in pyorrhœa alveolaris and chronic inflammation of the antrum, and, on account of its stimulant and astringent actions, has been used with benefit in stomatitis. The preparation for general use contains a 10 per cent. solution combined with 0.5 per cent. of chloretone. The solution should be prepared with warm water.

DENTAL FORMULÆ.

For Cancrum Oris, Aphthæ and Gangrenous Affections of the Mouth.

℞ Cupri sulph. (powdered) . . . . . gr.v
Mellis . . . . . ℥ss. M.
SIGNA.—Apply as a lotion, or by means of a camel's-hair brush.

For Gangrenous Ulcers of the Mouth and Cancrum Oris.

℞ Cupri sulph . . . . . ℥ij
Pulv. cinchonæ . . . ℥ss
Aquæ . . . . . ℥iv. M.
SIGNA.—Brush over ulcerated surface twice daily.

For Ulcerative Stomatitis.

℞ Cupri sulph . . . . . gr.x
Pulv. cinchonæ . . . ℥ij
Pulv. gum acaciæ . . ℥j
Mellis . . . . . ℥ij
Aquæ . . . . . ℥iij. M.

Signa.—Apply, by means of a camel's-hair brush, to the ulcerated surface.

For Caries of the Maxillary Bones.

Bartholow.

℞ Cupri sulph.,
Zinci chloridi . . āā partes xv
Liquor plumbi . . partes xxx
Aquæ destillatæ . . partes cc

Signa.—To be applied for 30 minutes at a time.

DIGITALIS.

Derivation.—Digitalis is obtained from the leaves of the *Digitalis purpurea*, or Foxglove. Digitoxin and Digitalin are the two most active principles, but neither will take the place of digitalis in medicinal use. The leaves of the second year's growth of the Digitalis purpurea are used, and when fresh are violently emetic and cathartic, but when dried, in smaller doses they are diuretic.

Medical Properties and Physiological Action.—As digitalis irritates mucous membranes which are wanting in tone, it should not be internally given in gastritis, etc. Its action is only manifested on the nerves when toxic doses are administered. Its action is chiefly manifested upon the circulatory system, as it increases the pulse-force and arterial pressure, and size of the pulse-wave, and slows the pulse, when moderate doses are given. When full medicinal doses are employed, or when poisonous doses are injected, the action of the heart becomes very irregular and dicrotic, and, according to Hare, it is not due to weakness, for the cardiac beats, when they occur, are in themselves more forcible than in health. Digitalis only effects respiration when poisonous doses are given, when it is slowed.

The medicinal dose has little or no effect upon the normal temperature of the body; it has no effect on the kidney structure, but sometimes causes nausea and indigestion by irritating the stomach.

Digitalis is a cardiac stimulant, and not a depressant.

Therapeutic Uses.—It is employed in all cardiac diseases, and is beneficial when the heart is irritable and palpitation is present, and the cause is not due to indigestion. It is also employed in cardiac weakness from collapse, and is particularly serviceable in aconite poisoning. To counteract its slow action, it should be

preceded by ammonia and alcohol in urgent cases. It is also useful as a diuretic in congested kidney affections, dropsy, and in cardiac dilatation and asthenia. Tannic acid is the chemical antidote; also the stomach-pump, and emetics if the heart is not affected; external heat about abdomen, and the maintenance of a horizontal position for several days after the active poisonous symptoms are manifested. Tincture of aconite is the physiological antidote. In all cases it is necessary that the slow absorption and elimination of digitalis should be remembered. Hypodermic injections of the tincture ♏xv–xxx are valuable in sudden heart depression resulting from any cause, such as shock or collapse from hemorrhage, or surgical operations, etc., etc. Digitalis must be used with care in fatty heart, aneurism, and cerebral endocarditis; digitalis acts slowly in inducing activity of cerebral functions, respiration, and circulation and therefore cannot always be relied upon alone, but can be assisted by ammonia, alcohol, etc.

ELECTROZONE.

Derivation.—Electrozone consists of a fluid which is nothing but sea or salt water subjected to an electrolytic current. It is a clear liquid, neutral in reaction, with the odor of free chlorine, and a disagreeable, salty taste. It was discovered by A. E. Woolf, who has succeeded in sterilizing polluted water with it on a large scale.

Properties and Dental Uses.—Dr. C. F. W. Bodecker recommends electrozone as an efficient antiseptic, and claims that it has given him uniformly satisfactory results in the treatment of purulent pulpitis. His method is to open the pulp-chamber freely and then syringe with tepid water. The electrozone is then introduced into the pulp-chamber on a small piece of cotton saturated with it, followed by one or two smaller pledgets moistened with the electrozone. The patient is then directed to renew only the last piece of cotton, from three to five times daily, or at least after every meal, using the precaution to rinse the mouth with a weak solution of electrozone (about a teaspoonful in a tumbler of water) previous to the removal of the cotton.

Every pledget of cotton, previous to its introduction, should be moistened with pure electrozone, and packed as tight in the

cavity of the tooth as possible. When the tooth has been treated in this manner for two or three days, the pulp-canal may be cleaned out and filled at once, without any fear of future pericementitis, provided that an infection of pericementitis has not already occurred.

ENZYMOL.

Derivation.—Enzymol is a purified solution of the proteolytic enzyme for external application, and is obtained by a direct solution from the stomach glands in a sterilized menstruum, being practically an artificial gastric juice, active and acid when diluted with water. It has an agreeable odor and flavor.

The action of the proteolytic ferment is not confined to purely alimentary substances, but is capable of dissolving albuminous matter in the various forms occurring in false fibrinous membrane, in diseased and sloughing tissues, blood coagula, etc.

Medical Properties and Action.—Enzymol is a physiological solvent, antiseptic, deodorizer and healing agent. It is effective in all situations where it can be brought and held in contact with septic matter. It dissolves by digestion, slough, granulations and detritus, without attacking the normal parts. It converts pus, necrosed bone, blood coagula, muco-pus, etc., into solution by simple hydration, the septic matter being readily discharged or removed by irrigation. It also destroys offensive odors, and possesses healing and curative effects. For general use it should be diluted with an equal volume of water. In treating necrosed bone, it should first be applied undiluted, in order to quickly and effectively dissolve the calcareous matter, after which the diluted form is applied. In cavities it may be applied by spray, compress, or by injection, or on sterilized cotton or wool moistened with it.

Dental Uses.—It is employed in alveolar abscess, alveolar pyorrhœa, disease of the antrum, ulceration of the gums, fractured bones of the jaws, etc.

ERGOTA—ERGOT.

Derivation.—Ergot is derived from the mycelium of the fungous growth which replaces the grain of the common rye. It is bitter, and excites heat and dryness, followed by pain in stomach,

thirst, vomiting and intestinal pain and sometimes purging. Small doses, long continued, cause spasms and death, by coma and asphyxia; gangrene of the lower extremities may follow its prolonged use.

Medical Properties and Physiological Action.—Ergot is a stimulant to and causes contraction of the involuntary or unstriped muscular fibres after entering the circulation. It is employed to produce contraction of the capillary vessels in hemorrhages that cannot be arrested by local treatment, and in such cases is given internally or hypodermically, the fluid extract being used; it is also employed in the hemorrhagic diathesis—hemophilia, administered internally in doses of one-quarter to one fluid drachm of the extract. Ergot stimulates the uterus to powerful contraction in labor, and controls post-partum hemorrhage. It is also administered in chronic diarrhœa and dysentery, enlarged heart without valvular lesion, gonorrhœa, acne rosacea, etc., etc. It is very serviceable in the hemorrhagic diathesis where there is a want of tonicity of the vessels; also used in epistaxis, uterine, renal and intestinal hemorrhage, and in hemoptysis, bleeding of hemorrhoids, etc.

Dose.—Of the fluid extract for internal use, f℥ 1/4 to ℥j; of the wine of ergot, ℥j to ℥ss; of the aqueous extract dissolved in water the hypodermic dose is gr. 1/4 to gr. iij.

Dental Uses.—Ergot in the form of the fluid extract—*Extractum Ergotæ Fluidum*—is useful, as an internal remedy, in the treatment of hemorrhage of the gums, and that following the extraction of teeth when it is excessive and persistent.

For Alveolar Hemorrhage.

Dr. Glassington.

℞ Liquid extract of ergot . . . . . ℥iss
Dilute sulphuric acid gtt.40
Water . . . . . to ℥iv.
Signa.—Two tablespoonfuls every half-hour until hemorrhage ceases.

ESSENTIAL OILS.

The volatile or essential oils are compounds of carbon and hydrogen, and differ from the fixed oils, which are compounds of carbon, hydrogen and oxygen, the molecular arrangements of

which are similar to the metallic salts and compound ethers—pos sessing the radicals of certain acids united with hydro-carbons. The essential oils act as antiseptics without coagulation, and are generally absorbers of oxygen, and such of them as the oils of peppermint, cloves, caraway, cajuput, mustard and turpentine are useful obtunders of hypersensitive dentine; and some are also very efficient germicides and antiseptics. The oil of thyme and oil of cinnamon are generally considered to head the list of the essential oils in antiseptic power. From experiments noticed by Dr. Harlan, the essential oils are not miscible with water; hence when they are used as a root-dressing they are not contaminated or dissipated by the saliva or the mixed fluids of the mouth. They are capable of depositing vaporizable camphors that are powerful disinfectants, and are soluble at a temperature below body heat. They are good menstrua for iodine compounds, and oily dressings, when not too tightly confined in a pulp-chamber, are not vitiated like substances which are soluble in water. They may be allowed to remain for longer periods in the roots of teeth, when it is not possible to fill such roots at once. When an oily dressing (such as oil of peppermint or oil of cassia) is applied in a root canal, after the removal of a pulp by extirpation or its devitalization by arsenic, it acts as an anodyne and also as an antiseptic, preventing the formation of mephitic cases. The oily dressings may be pumped through roots and fistulous tracts with impunity, and will not clog delicate canals. The solutions of the essential oils are all made as follows (Dr. Black): "An excess of the oil is mixed with water by violent shaking continued for some minutes. It is then placed in the incubating oven, where the temperature is 99° F., for twelve hours. It is then again violently shaken and returned to the oven for another twelve hours, twenty-four hours in all. It is then carefully filtered, and if not perfectly clear and free from all appearance of oil, it is refiltered until it is clear. The filtrate is then used as the solution of the oil. The same plan is used in making saturated solutions of the crystalline substances."

The prominent essential oils are those of cajeput, cassia, cinnamon, cloves, eugenol, eucalyptol, fennel, mustard, caraway, peppermint, sassafras, turpentine, thyme, pennyroyal, valerian, wintergreen. In dental practice the oil of cassia diluted with a

bland oil like that of wintergreen is a valuable dressing for putrid root canals and abscesses. Dr. Black recommends the following mixture:

℞. Carbolic acid (melted crystals), 1 part; oil of cassia, 2 parts; oil of wintergreen, 3 parts. Mix the oils and add the melted crystals of carbolic acid. This is known as the 1, 2, 3 mixture.

Dr. Black also says: "After thorough cleaning with the watery form of the antiseptic we need something that will be more enduring in its effects, and according to conditions, should choose between the oils and the powders. If it is an abscess with which we have to deal, an oil which is in itself an antiseptic, or an oil holding the antiseptic drug in solution in effective proportions, may be introduced into the cavity and so agitated as best to bring it in contact with all of its parts. This will, on account of its sparing solubility, remain in position very much longer than the watery forms, and the essential oils are very much more diffusible than the fixed oils, or, indeed, any other of the simple forms of the antiseptics with which I am yet acquainted. At the same time a sufficient amount for very extended work is contained in small compass. These are of especial value in such positions as the roots of teeth. In this position any but the most irritating of the antiseptic essential oils may be used to good advantage, and may be relied upon for many days together. In the choice of the essential oils it is by no means necessary that the most powerful of them be selected. It should be remembered in making the choice that the more powerful antiseptics are the more irritating as a rule. It is, therefore, often best to choose antiseptics of very moderate range, especially where it is only required to preserve a condition of asepsis. For instance, when a very foul root canal is opened, such an antiseptic as the oil of cassia is indicated. After appropriate cleaning, and especially in case cleaning is to be deferred for fear of forcing poisonous material through the apical foramen, it may be used in full strength; in which form it may be relied upon as a disinfectant as well. But afterward, when it is only a matter of holding an aseptic condition during the healing of the parts, an antiseptic of shorter range, that is not so liable to injure the tissues, is to be preferred. For this purpose the eucalypti extract in substance is a very useful agent. Its

range of actual inhibition is very short, but its injurious effects on the tissues are also very slight, so that the healing process may go on in its presence without hindrance. Furthermore, this oil has a very extended range of restraining influence beyond its range of actual inhibition that is undoubtedly of much use. This oil may be exchanged for terpinol where a little more stimulating effect is regarded as beneficial. The oil of cloves and the oil of cinnamon seem to occupy a middle ground, and may be made useful in a large class of cases if the others are in any wise distasteful to the dentist or his patient. The oil of mustard, though a good antiseptic of short range, has an irritant action that limits its use. Yet in cases where it is desirable to arouse the tissues from a state of inactivity this action, in a high degree, is combined with the antiseptic property. It is also one of the most diffusible of the antiseptic oils thus far studied.

"Any of these oils may be used in the emulsion, if, for any reason, it is not thought well to use the oil in substance. This form is especially recommended for surfaces of suppurating wounds and the washing of abscesses. In this way small quantities of the oil may be widely diffused and left in a multitude of minute globules, to gradually dissolve where it is most wanted, forming a kind of connecting link between the true solutions and the oils in substance. For this purpose a little of the oil selected may be diffused through water by severe shaking, or better, by repeatedly filling and violently emptying the syringe. The milky emulsion thus formed may be used in the same manner as the solution.

"I have said that all antiseptics are poisons. I wish to emphasize this statement. They are antiseptic by virtue of their power of restraining life forces; and their use as antiseptics is permitted only by shades of difference in the action of certain poisons toward the different forms of life, by which they affect the fungi more prominently than the animal tissues."

The essential oils are not saponifiable, and are, therefore, not true oils, but are usually the essential principles of the plants from which they are obtained. The following are the important essential oils:

Bitter almond, oleum amygdalæ; bergamot, oleum bergamottæ; anise, oleum anisi; orange peel, oleum aurantii corticis;

orange flowers, oleum auranti florum; oleum cajuputi; caraway, oleum cari; cloves, oleum carophylii; cinnamon, oleum cinnamomi; wintergreen, oleum gaultheriæ; eucalyptus, oleum eucalypti; juniper, oleum juniperi; lemon, oleum limonis; peppermint, oleum menthæ piperitæ; nutmeg, oleum myristicæ; allspice, oleum pimentæ; rose, oleum rosæ; sassafras, oleum sassafras; mustard, oleum sinapis; turpentine, oleum terebinthinæ; thyme, oleum thymi; lavender, oleum lavendulæ.

ETHYL CHLORIDUM—(MONO-CHLOR-ETHANE).

CHLORIDE OF ETHYL.

Formula.—C_2H_5Cl.

Derivation.—Ethyl chloride is a haloid derivative, prepared by the action of hydrochloric acid gas upon absolute alcohol; it may also be obtained as a by-product in the manufacture of chloral. It belongs to the ether class, and at ordinary temperature is a gas; but it is easily compressed, and then forms a colorless liquid possessing an agreeable, but not very strong ethereal odor, boiling at 55° F., and burning with a green flame. It is now sold in strong glass tubes, each of which contains 30 grammes of ethyl chloride. The tube terminates in each end with a capillary orifice, up which is fixed a copper screw thread On this screw a cap, also of copper, and lined with rubber, closes it so tightly that the ether is prevented from evaporating. The escaping stream of vapor is, on the unscrewing of the cap, attenuated to the greatest degree possible, and then directed upon the surface to be anæsthetized. It is inflammable, but not explosive.

Mode of Application.—The distance at which the glass tube should be held from the part to be anæsthetized varies considerably, for it may be six, eight to ten inches, depending somewhat upon the size of the aperture in the elongated end of the tube; it is necessary that the stream of vapor should reach the tissue exactly at the time of perfect volatilization. The tube should be warmed to about 75 degrees by placing it in hot water. The Gebauer tube is well adapted for dental purposes. As it is difficult to direct the stream of ethyl chloride upon the tissues in the posterior part of the mouth, it has been recommended to direct the stream upon the check in front of the tragus of the ear; but

usually it is not successfully applied to the posterior part of the mouth for the extraction of the second and third molars. As ethyl chloride is very inflammable, it should not be used near an open flame, nor with the thermo-cautery, and its vapor should not be inhaled as it is a rapid and powerful general anæsthetic, the safety of which, as a general anæsthetic, has not yet been determined. Each flask or tube contains about ten grammes of pure chloride of ethyl, which is considered to be sufficient for the extraction of about four teeth.

Therapeutic Uses and Action.—Chloride of ethyl is employed in minor and dental surgery as a local anæsthetic, and its application does not occasion any untoward accessory symptoms, and it has no influence on the brain, having in this respect a great advantage over methyl chloride whose application is followed by a weakness of memory usually lasting for more than twelve hours; ethyl chloride does not produce the extraordinary cold which may cause destruction of tissue as does methyl chloride. Chloride of ethyl will produce general anæsthesia if inhaled, and it is therefore necessary when applying it within the mouth to have the patient breathe only through the nose, as there is no evidence of its safety as a general anæsthetic. Properly applied, and not too long continued, there is no danger of freezing the part to the stage of devitalization with consequent sloughing. On account of its great inflammability it must be used at a safe distance from a flame—preferably under electric light when applying it at night. As it is extremely votatile it should be kept in a cool place; and this extreme volatility is a proof that its effect upon the human system is of correspondingly brief duration, as it acts not by virtue of any inherent anæsthetic properties, but on account of the intense cold produced by its extraordinary rapid volatilization. The effect of the application of chloride of ethyl is shown by the blanching of the gum tissue at the focus of the evaporation, and its readiness and safety commend it for minor surgical operations. Its depressing effect upon the circulation when administered is too pronounced for it to be regarded as a safe general anæsthetic. As a local anæsthetic, however, it has practically no effect upon the human system, and any of the drug that is absorbed into the system is eliminated in the course of a few minutes. It has given satisfactory anæsthe-

sia in operations for cellulitis of fingers, buboes, abscesses, sinuses, boils, carbuncles, in-growing nails, etc., all forms of neuralgic pain, rheumatic pain, hyperæsthenic and reflex conditions.

Dental Uses.—Chloride of ethyl is employed in dental practice as a local anæsthetic for the extraction of teeth, and has proven very satisfactory in many such operations. The adjoining teeth should be protected by a fold of napkin, the gum dried about the tooth to be extracted, and then the crown coated with glycerin, or vaseline, and the vapor directed on the gum and not upon the tooth until the former turns white, when the forceps are applied. Slight anæsthesia may be induced by the patient inhaling the vapor. On account of the severe pain caused by the extreme cold it generates, its use is prohibited in pulpitis and acute pericementitis. Chloride of ethyl is also employed for the relief of neuralgia by directing the vapor along the track of the affected nerve; also for diagnosing peripheral from centric neuralgias by applying the vapor at the point of irritation—if the neuralgia results from peripheral irritation the pain will cease at once; and intermittent applications, continued for from twenty to thirty minutes, are often curative when the irritation is not due to exposure of the pulp. Chloride of ethyl may also be employed for opening alveolar abscesses, removing tumors of the mouth, and in other painful affections of the oral cavity. Prof. C. Redard suggests that in the extraction of teeth in the lower jaw the vapor or stream be directed externally against the cheek, over the inferior maxillary nerve; while in the extraction of teeth from the upper jaw it be directed in front of the ear at the exit of the trigeminal nerve. When applied to a part chloride of ethyl first causes a hyperemia, then pallor, and gradually the part assumesa parchment-like appearance. From one to two minutes is gradually required, and the anæsthesia lasts as long again. It has been suggested to occasionally combine the action of chloride of ethyl with that of cocaine.

Anestile is a mixture of ethyl and methyl chlorides and acts in the same manner as chloride of ethyl. (See *Coryl.*)

Coryl is a mixture of ethyl and methyl chlorides and is a refrigerant local anæsthetic less powerful than the chloride of methyl, but more so than chloride of ethyl. It is inflammable, and boils at 32° F. It will cause anæsthesia in 15 to 20 seconds

Kalene, it is claimed, is a pure form of ethyl chloride.

Ethylic Ether is a very inflammable local analgesic, which forms an explosive mixture with the air; it boils at 98.6° F .

ETHYL BROMIDUM—BROMIDE OF ETHYL.

HYDROBROMIC ETHER.

Formula.—C_2H_5Br. Sp. gr. 1.420.

Derivation.—Bromide of Ethyl is obtained from bromide of potassium, sulphuric acid, alcohol and water, by distillation, and is re-distilled by chloride of calcium. It is a colorless and very volatile liquid, boiling at 40° C., heavier than water, and possesses an agreeable ethereal odor, and a pungent taste, strong and sweetish, with a somewhat burning after-taste. It is readily soluble in alcohol and ether, and but sparingly soluble in water.

Medical Properties and Action.—Bromide of ethyl, like all other agents of this class, must be administered with great care, and a pure article employed. There is no doubt but that it is pleasanter to inhale than chloroform, exceedingly rapid in producing complete unconsciousness, and very evanescent in its action; but, from the fatalities attending its use, it is a dangerous agent. Like chloroform, ethyl bromide destroys life by its effect upon the heart; on account of its being essentially poisonous owing to the large percentage of bromine which it contains; and its poisonous effect when not at once fatal is prolonged and dangerous to the heart, and other vital organs, especially the kidneys. Its poisonous effects are more pronounced when it is administered in an upright or even half-reclining position as for dental operations.

Introduced into the stomach, bromide of ethyl does not produce anæsthesia, as when absorbed by the respiratory organs, and does not increase the pulse over its normal beat; and in the second stage, causes an intermission of the pulse every second beat.

Administration.—Bromide of ethyl when employed as an anæsthetic is best administered in a folded starched napkin, so as to cover the face, and having inside of it a soft linen handkerchief. On the linen handkerchief one measured drachm

of the agent should be poured, and the patient directed to take long, deep inspirations, or, what is better, to make prolonged and forced expirations. In two minutes from the time of administration of the first drachm, a second should be given, and this should be repeated at intervals of two minutes. Like all general anæsthetics, however, the quantity for inhalation differs according to the susceptibility of the patient. One drachm (or in some cases two drachms may be required, according to the susceptibility of the patient) of the bromide of ethyl will generally, in from one to three minutes, produce an anæthesia as profound as that produced by an ounce of sulphuric ether. As it produces an anæsthetic effect on the muscles of the throat and upper parts of the pharynx, it is useful for operations on the mouth and throat.

The effect of an anæsthetic, however, is to be more regarded than the mere quantity of the agent poured upon a napkin or sponge, as the degree of anæsthesia should be governed, in most cases, by the nature of the operation to be performed under its influence.

The odor of bromide of ethyl is more rapidly removed, and is more agreeable than that of sulphuric ether, and its effect more rapid than even those of chloroform, as it is eliminated by respiration and by the kidneys. Having no caustic action, it can be safely applied subcutaneously, and also to the external auditory meatus and to the mucous membrane. It evaporates upon the skin very rapidly, producing a very sensible feeling of cold. The general effects claimed for ethyl bromide are as follows: Moderate acceleration of the pulse and respiration; slight excitement or talking, and seldom any struggling; flushing of face; dilatation, sometimes preceded by contraction of pupil; diaphoresis, generally profuse; complete anæsthesia in two or three minutes; recovery of consciousness in from one to two minutes after the withdrawal of the anæsthetic agent; no after-vomiting.

Any specimen of bromide of ethyl which has a disagreeable odor, or which, on standing, becomes brown, or any that will explode and burn, is impure and should not be employed for inhalation. A common impurity is *bromoform*, produced by the action of bromine and caustic potassa on alcohol or wood spirit. Bromide of ethyl possesses properties intermediate between those

of chloroform and ether. As a local anæsthetic it is highly spoken of, and, owing to its non-inflammability, is the only anæsthetic which can be used in connection with the actual cautery. Dr. Byrd strongly recommends an anæsthetic mixture of bromide of ethyl 1 part, chloroform 3 parts and alcohol 4 parts, a drachm of which is poured upon the sponge of the inhaler, which the patient is allowed to inhale with the stopper out, after which the stopper is replaced and the full strength of the mixture inhaled. Generally in five minutes the patient is fully anæsthetized, when the stopper may be taken out to permit a greater admixture of air, and replaced as the judgment of the operator may dictate. This mixture, it is claimed, is safer and less disagreeable in its effects than the bromide alone. For use as a local anæsthetic, the bromide of ethyl is atomized with the "spray apparatus," which should furnish enough of the liquid to moisten the skin. The extremity of the tube should be held some two or three inches from the surface on which the spray is to be thrown. Within two or three minutes after its first application, anæsthesia of the part occurs, which is shown by the appearance of a white spot. The formation of this spot may be hastened by superficially puncturing or scratching the skin. The sensation of cold thus produced is sometimes disagreeable, but is rarely painful.

Given internally it is also said to relieve gastric pain without affecting the appetite. Inhalations have been used to relieve convulsive cough; and, introduced on cotton wool into the external meatus, it is said to relieve the pain of otalgia, without causing any irritation.

EUCAINE.

Formula.—$C_{19}H_{27}NO_4HC1H_2O$.

Derivation.—Eucaine is an artificial alkaloid produced by the reaction between acetone (dimethyl ketone, CH_3COCH_3), and ammonia. Two chemical substances having the name of Eucaine have been introduced, each of them depending for its anæsthetic property upon the presence of the benzoyl molecule in its constitution. They are called, Alpha-Eucaine and Beta-Eucaine. Although Alpha-Eucaine was the substance usually sold under

the name of Eucaine, yet it is as poisonous as cocaine, while Beta-Cocaine is not, cocaine being three times more toxic. The use of Alpha-Cocaine has been almost entirely discontinued. The salt principally employed is the hydrochlorate which, when evaporated from the aqueous solution, retains one molecule of water of crystallization.

Hydrochlorate of eucaine A is in the form of a white, odorless crystalline substance, or powder of a bitter taste like that of quinine, and soluble in 10 parts of water, and in chloroform and alcohol. Hydrochlorate of Eucaine B is soluble in 28 parts of water.

Medical Properties and Action.—Eucaine is a local analgesic of the paralyzant class, and when applied locally, induces some hyperemia of the mucosæ, rather than anemia, but, nevertheless, causes a very decided loss of sensibility. It is less poisonous than cocaine, although it is more irritant and less soluble; their dosages are very similar. Lethal doses cause excitation of the central nervous system, convulsions affecting all the muscles, general paralysis, and death by a failure of the respiration. There is no ischemia due to contraction of the blood vessels, as in cocaine anæsthesia, and no paralysis of accommodation. According to Prof. Hare, however, eucaine is capable of producing internal effects resembling an over-dose of cocaine, which must be treated by the use of strong coffee, alcohol, digitalis and strychnine. If the case is pressing, ether, ammonia and nitro-glycerine may be used as rapidly acting stimulants. Solutions of eucaine hydro, chlorate (one part to ten parts of sterilized water) remain permanently unchanged, and boiling will not produce decomposition, which is another advantage over solutions of cocaine hydrochlorate. This immunity is supposed to be due to its immediate derivation from pure chemicals, instead of from vegetable sources. The local effect of eucaine hydrochlorate upon the circulation is the production of hyperemia, whereas that of cocaine is ischemia Eucaine also exalts the nervous system, when paralysis follows, the effect being central, causing acceleration of the heart-beats through sedation of the pneumogastric nerve. Experiments made by Dr. A. H. Peck lead him to conclude that the action of cocaine is inconstant, while those of eucaine are constant; that the first action on the heart and respiration of eucaine is that of

a stimulant, the after-effects being that of a decided depressant; that eucaine causes death in animals by paralyzing the muscles of the heart and of the respiratory apparatus, they ceasing to operate simultaneously, while cocaine causes death by paralyzing the muscles of the respiratory apparatus, the heart's action continuing in a feeble way for a brief period after breathing ceases; that eucaine in toxic doses nearly always causes nausea, and occasionally vomiting, while cocaine is much less nauseating and scarcely ever causes vomiting; that cocaine is at least three times more toxic than Beta-Eucaine, and that Alpha-Eucaine is as toxic as cocaine. Eucaine solutions should be prepared with distilled or sterilized water, and then brought to the boiling point. All solution should be freshly prepared to obtain the positive results.

Dental Uses.—Beta-eucaine is employed in dental practice as a local anæsthetic. A ten per cent. solution may be made by adding 48 grains of beta-eucaine to the ounce of distilled water, and the solution brought to the boiling point. Of such a solution (10 per cent.) five to eight minims is a proper dose by hypodermic injection. Some recommend an eight per cent. solution as strong enough for the painless extraction of teeth. The mode of application and the precautions to be observed in employing such a solution in the extraction of teeth are similar to those for the administration of cocaine solutions.

Eucaine solution is also serviceable in capping crowns of teeth, inserting bridge-work, and applying clamps in connection with the rubber dam, especially when the gums are tender and bleeding; also for hypersensitive dentine, especially by the cataphoric method. (See Vapocaine.)

EUCALYPTUS.

Source.—Eucalyptus is obtained from the eucalyptus globulus, a tree of large size, and of the natural order Myrtaceæ, found originally in Australia, and known as the "Blue Gum Tree." These trees are now growing in the southern parts of Europe and the United States, and northern Africa, and their presence is thought to be preventive of malaria. The leaves, which are ensiform, of a grayish-green color, and parchment-like, are the only part which possesses medicinal qualities. They have a

pleasant, aromatic odor, with a warm, bitter, and somewhat pungent taste, like that of cubebs, the fresh being more active than the dried leaves.

The chief medicinal constitutent of eucalyptus is the oil (*Oleum Eucalypti*, U. S.), from which is derived a camphoraceous body obtained by re-distillation with caustic potash or chloride of lime, known as *Eucalyptol*, U. S. The oil of eucalyptus and eucalyptol are used for the same purposes, but eucalyptol is the refined product of the oil.

Medical Properties and Action.—Eucalyptus is antiseptic, disinfectant, sedative, tonic, diaphoretic and somewhat astringent. When taken into the mouth, it excites a flow of saliva, and leaves a hot, pungent taste, and a persistent and disagreeable odor. When introduced into the stomach, it causes a sensation of warmth, and promotes the secretion of the gastric juice. Being stomachic, it increases the appetite and the digestive action, with increased intestinal secretion. Large doses produce offensive eructations, a feeling of weight and tension at the epigastrium, and indigestion, followed by diarrhœa, and irritation and congestion of the kidneys. It increases the action of the heart, lessening the arterial tension, and causes a feverish condition. It accelerates the respiratory movements, and although it induces sleep in the weak and anemic, it has the opposite effect on the strong and healthy. The secretions of the skin, mucous membrane and kidneys are increased by it, and become strongly odorous, owing to the presence of eucalyptol, a name given to the oil. The inhalation of large quantities of the vapor produces effects anolagous to those of the agent when taken in substance, and the essential oil is readily diffusible and readily impregnates the blood.

Therapeutic Uses.—While the internal use of eucalyptus is contra-indicated in inflammatory conditions, it is a very efficient remedy in atonic dyspepsia; chronic gastric and intestinal catarrh, cachectic conditions, flatulence, palpitation of the heart, hysteria, chorea, asthma, catarrhal broncho-pulmonary affections, chronic diseases of the liver and bladder, etc. It is also employed in intermittent fever, and during convalescence from remittent fever. Externally, it is an efficient application to chronic forms of angina and tonsillitis, to foul ulcers and wounds, etc.

Dose.—Of the *Oleum* Eucalypti—ɱx to xv; its active principle—*Eucalyptol*—is to be preferred to the oil as more concentrated and uniform in action. Dose of eucalyptol ɱv to x in capsules.

Dental Uses.—In dental practice, the decoction of the leaves is an efficient local application in the different forms of stomatitis, after the acute stage has subsided. The tincture and the distilled water of eucalyptus, or fluid extract, are used as disinfectant applications in indolent offensive ulcers of the mucous membrane of the mouth, stomatitis, pharyngitis, etc. The tincture of eucalyptus has been employed with advantage to obtund the sensibility of dentine. The oil of eucalyptus, either alone or combined with iodoform, forms one of the most effective antiseptics in use, for the treatment of putrescent pulps of teeth, alveolar abscess, of the chronic form, pyorrhœa alveolaris, foul ulcers of the mouth, etc.

No other preparation appears to prove more efficient as an antiseptic than the combination of eucalyptus oil and iodoform, in the treatment of suppurating conditions, putrescent pulp-canals, necrosis, and caries of the bones of the jaws, etc. The oil can be introduced as an injection, with an abscess syringe, or by means of a fine broach armed with cotton, taking care that the agent is carried to the seat of the disease, and the application repeated as often as necessary. It may also be applied by dipping a pledget of cotton in the oil and then in finely pulverized iodoform (Truman), and carried to the tooth, as in cases of putrescent pulps. It is also employed as a local anæsthetic for odontalgia, and as an astringent or styptic in superficial hemorrhages, mucous discharges, ulcerating mucous membrane of the mouth, and for spongy, ulcerating gums.

Eucalyptus has a solvent effect upon gutta percha, a fact which should be remembered when using it in connection with temporary fillings of the former material, or of Hill's stopping.

Euthymol.—Each fluid ounce is composed of oil of eucalyptus 3.8 minims, thymol 15.32 grains, oil gaultheria 9.32 minims, menthol 5.64 grains, boric acid 10 15/16 grains, and fluid extract wild indigo 11.4 minims. Antiseptic, Germicide, and Deodorant.

Euthymol is a powerful germicide while it is innocuous in its

effects, and in addition to its deodorant properties it is detergent, readily cleansing both the hands and instruments, and by its use any operation can be made aseptic, thus preventing septic infection. It may be employed as a mouth-wash. It keeps without deterioration, and its liquid form insures prompt and accurate dilution at any instant. It is applied externally as a douche, as a spray, by atomization, etc. It does not stain fabrics, and has no unpleasant odor.

EUFORMAL is composed of oil of eucalyptus, oil of gaultheria, thymol, menthol, boric acid, fluid extract of wild indigo, and formaldehyde (40 per cent.). It is a more powerful antiseptic, disinfectant and germicide than euthymol, and combines the properties of euthymol with the germicidal power of formaldehyde, and is very efficient as a deodorant. It is non-toxic, non-irritant, and does not stain. It quickly removes putrid odors from decomposing animal and vegetable matter, combining with sulphuretted hydrogen and ammonia bases generally to form inodorous compounds. It removes the odor of perspiration, and destroys the disagreeable smell of the feet, for which it is used in a diluted form. It disinfects instruments and hands, and is useful as a prophylactic in infectious diseases. It is of great value as a mouth-wash to remove offensive breath, in the proportion of half a teaspoonful of euformal to a tumblerful of water used as a gargle. It also proves useful in bites and stings of insects.

Wyeth's Antiseptic Solution.—Composed of proportionate combinations of eucalyptus, gaultheria, mentha arvensis, and baptisia tinctoria, with 16 grains of benzo-boric acid in each fluid ounce.

DENTAL FORMULÆ.

For Abscess of Antrum.

℞ Olei eucalypti . . . ℥ij
Acidi carbolici . . . gtt.x
Glycerini . . . . . ℥ij
Olei gaultheriæ . . . ℥ss. M.

SIGNA.—Use as an injection.

For Suppurating Pulps, Ulcers, etc.

℞ Olei eucalypti . . . ℥j
Iodoformi . . . . . gr.xv. M.

SIGNA.—Apply as an injection, by means of a syringe; or on cotton wrapped on the end of a fine broach; or on a strand of floss-silk.

For Abscess of Antrum.

DR. GEO. L. PARMELE.

℞ Eucalypti . . . . . ℥j
Iodoformi . . . . . g.x
Aquæ . . . . . ℥j. M.

SIGNA.—To be used as an injection in connection with a tent of floss-silk saturated with glycerine and eucalyptus.

For Root Canals as an Antiseptic.

DR. R. D. PEDLEY.

℞ Olei eucalypti . . . 2 parts
Olei caryoph. . . . . 3 parts
Creasoti . . . . 10 parts. M.

Into this dissolve gum mastich to saturation filter through cotton-wool and thoroughly incorporate with iodoform in a mortar until it becomes a solid mass.

SIGNA.—Introduce on floss-silk or wisps of cotton, and cap it with a disk of metal and insert temporary filling.

For Alveolar Pyorrhœa.

(*Riggs' Disease*).

DR. G. V. BLACK.

℞ Olei eucalypti . . . ♏xc
Acidi carbolici . . . ♏xc
Olei gaultheriæ . . ♏xxx. M.

SIGNA.—Apply by means of an abscess syringe.

EUGENOL—ACETAMID.

Eugenol-acetamid is prepared as follows· Monochloracetic acid is acted upon by eugenol sodium, when eugenol-acetic acid results. This acid is treated with alcohol and hydrochloric acid, by which it is converted into the "ethylester of eugenol-acetic acid. Strong alcoholic ammonia converts this into eugenol-acetamid. As crystallized from water it occurs in lustrous scales; from alcohol in fine needles; melting at 110°."

Therapeutic and Dental Uses.—It is claimed for eugenol-acetamid, that when it is applied in the form of a fine powder, it produces local anæsthesia without any caustic action, similar to cocaine. It has been successfully employed as a local anæsthetic in the treatment of wounds; and is also recommended as an obtundent in the extraction of teeth.

EUROPHEN—ISOBUTYL-ORTHO-CRESOL IODIDE.

Derivation.—Europhen is obtained by the action of isobutyl-alcohol upon *o*-cresol in the presence of chloride of zinc at an elevated temperature, producing isobutylcresol. This is then acted upon by iodine in potassium iodide, the resulting iodine compound being isobutylorthocresoliodide or europhen. Europhen is an amorphous yellow precipitate, which is separated by filtration and cleansed by washing, and afterward dried in the dark at ordinary temperature.

The percentage of iodine in europhen is about 27.6, which corresponds accurately with a proportion of one atom of iodine to two molecules of isobutylcresol. Europhen is resinous to the touch, and when applied to the mucous membrane or to the skin, adheres tenaciously. It possesses an aromatic odor, which, however, disappears when it is made into a solution or mixture. It is insoluble in glycerine or water, but readily soluble in alcohol (30 per cent.), ether or chloroform (equal weight), and such compounds of these agents as collodion, and liquid gutta percha, and also in fatty oils. A 25 per cent. solution of europhen can be made by rubbing it at a low temperature in olive oil, which, after being filtered, remains clear for a long period. In contact with wound secretions, it gives off slowly small quantities of iodine, which are immediately combined again, and form the soluble compound. The chief action of europhen can be ascribed to this formation in the nascent state; hence there is present in this agent very small quantities of free iodine, which form during the drying process and cannot be removed from it,—the percentage has been estimated at about 0.03 per cent.

On account of europhen being easily decomposed, all starch mixed with it and also mixtures of metallic oxides are contra-indicated. Talcum is employed to make with it a thick paste, and simple mixtures of it with fats, vaseline or lanoline are very durable, especially the latter. Europhen solutions must be prepared at a low temperature, and they must be protected from the light and moisture.

Therapeutic Action.—Europhen is employed as a substitute for iodoform in the treatment of wounds, as, it is claimed, that a given weight of europhen will cover five times as large a wound surface as the same weight of iodoform; and also that it will prove efficacious in cases where iodoform fails.

Its freedom from odor and non-toxic effects are also advantages over iodoform.

Dental Uses.—Europhen is employed in dental practice for irritation and inflammation of the oral mucous membrane, such as may result from artificial dentures, crown- and bridge-work, as it acts promptly and efficiently in reducing the swelling and soreness; also in syphilitic mucous patches on the cheeks and tongue; it is also employed to relieve the pain of inflamed or

suppurating pulps of teeth on account of its rapid action. Dr. A. W. Harlan recommends for such purposes, powdered europhen rubbed up with lanolin (25 parts of europhen to 75 parts of lanolin). He has also found such a combination to be of service in the after-dressing of the pockets of alveolar pyorrhœa, and as a parasiticide, and as a dressing in empyema of the antrum.

The powdered europhen is also applied in gingival inflammations resulting from setting crowns and bridges, with great success; also to an inflamed and suppurating pulp.

FERRUM—IRON.

Chemical analysis demonstrates the presence of iron in the blood, the gastric juice, chyle, lymph, bile, milk, urine and the pigment of the eye; and, although metallic iron is inert, yet, when it reaches the stomach, it is dissolved by the acids, and thus acquires molecular activity. By its oxidation in the stomach hydrogen is set free, which in its nascent state unites with sulphur, forming sulphuretted hydrogen.

Medical Properties and Action.—The salts of iron act through and upon the blood, affording material for the coloring matter of the red corpuscles and improving its quality and increasing its quantity, and hence they are termed "hematinic." These salts of iron are absorbed into the system, and are detected in the blood, urine, etc., and under their use the appetite increases, the digestion is improved, the pulse increases in frequency and fulness, the health becomes better, and there is an increase in flesh and an improvement in color; hence they are "restoratives." As these salts of iron in large doses cause nausea and vomiting, being irritant poisons, and even small doses, when administered for a long period, exhaust the gastric glands by over-stimulation, their use is contra-indicated in a plethoric condition, especially when accompanied with a hemorrhagic tendency, or when there is an atheromatous state of the cerebral vessels. Certain of these salts, such as the sulphates, the chlorides, and the nitrates, possess a high degree of astringency, and when taken internally produce constipation. Brought in contact with the blood, they coagulate it, and solidify the albuminous elements of the tissues, being powerful "hemostatics."

Without great care is exercised in the internal administration of iron, owing to the acidity and astringent property of many of these preparations, injury results to the teeth, upon which they act with great energy. The tincture of the chloride and the sulphate, as shown by the experiments of Dr. Smith, of Edinburgh, Scotland, are more corrosive than the wine of iron, and even more injurious than the compounds of iron with the vegetable acids; the preparations of iron having an acid reaction are more injurious to tooth structure, but any preparation of iron will discolor the teeth if cleanliness is not observed. The use of an alkaline gargle of carbonate of soda, or prepared chalk, or solution of ammonia, before and after the taking of the iron preparation into the mouth, and the subsequent employment of an antacid dentifrice, will obviate the injurious effects of these salts of iron upon the teeth. While neither the carbonate of iron in the form of pill, nor the reduced iron, are injurious to the teeth by direct action, yet eructations of hydrogen compounds produced by their ingestion may injure the teeth.

The use of a tube carried well back in the mouth and the iron preparation well diluted, should be preceded and followed by the alkaline solution. The preparation known as dialysed iron —*Ferrum Dialysatum*—which is iron in the colloid state, made by the process of diffusion, is odorless, without the styptic taste of the other preparations, and does not discolor the teeth, being free from irritant action; neither does it cause constipation, and hence it is the best form in which to administer iron. The dose of dialysed iron is ♏v to ℥j; locally it is applied to the gum tissue in the treatment of arsenical necrosis.

Therapeutic Uses of Iron.—Iron is employed in its pure form of reduced iron or in one of its numerous combinations. The usual forms are ferrum reductum, ferri pyrophosphas, massa ferri carbonatis, tinctura ferri chloridi, and syrupus ferri iodidi. The compound salts are ferri oxydum hydratum, and ferri oxydum hydratum cum magnesium, which are the best antidotes to arsenic.

Iron is an efficient tonic, and promotes the appetite and the digestion; hence it is employed in anemia, chlorosis, combined with quinine in chronic malarial affections, syphilitic cachexia, acute rheumatism, erysipelas, diphtheria, scrofula, rickets, neu-

ralgia depending on anemia, epilepsy in weak, anemic subjects, fatty degeneration of the heart, passive forms of hemorrhage due to anemia, albuminuria, etc., etc. Externally, the styptic preparations of iron are employed to arrest hemorrhage—hemorrhage from leech bites, hemorrhage following the extraction of teeth, hemorrhage resulting from wounds and surgical operations, etc., etc.

[For doses of the various preparations of iron, see "Table of Doses."]

CHLORIDE OF IRON—*Ferri Chloridum*—Perchloride of iron *Formula*, Fe_2Cl_6, is obtained by heating iron wire with hydrochloric acid, and afterward converting the ferrous chloride thus formed into ferric chloride by heating it with hydrochloric and nitric acids. It is in the form of crystalline masses of an orange-yellow color, inodorous and of a strong styptic taste. It is deliquescent and readily soluble in water, alcohol and ether. In arsenical necrosis Weld's syrup of chloride of iron is an efficient application. Chloride of iron is also used internally in the form of a tincture—*Tinctura Ferri Chloridi*. *Dose*, ɱv–xx.

Externally the chloride of iron is employed as a styptic and as an astringent, for the latter purpose being in the form of solutions of various strengths.

Dental Uses.—In dental practice the chloride of iron is used internally for the treatment of neuralgia when it is attended with anemia; also externally, for the arrest of alveolar hemorrhage, although the preference is given to the solution or powder of the subsulphate, but adenalin chloride is a more reliable styptic than any of the iron preparations. The chloride of iron may be used in the semi-deliquesced or crystallized form, or in solution—*Liquor Ferri Perchloridi*—which is preferred by some to the crystallized. To bleeding surfaces it is applied in the proportion of ʒss to ʒvj to the ounce of water. One part of the chloride gradually added to six parts of collodion, in the form of a yellowish-red, limpid liquid, makes a valuable styptic. Chloride of iron is also useful as an application to fungous tumors.

Reduced Iron—Ferrum Reductum—is metallic iron in the form of a fine powder, obtained by the reduction of ferric oxide by hydrogen. *Dose.*—Gr. j to gr. v.

Solution of Subsulphate of Iron—Liquor Ferri Subsulphatis—

Monsel's Solution—*Formula:* $2Fe_2O_3(SO_4)_3$—is composed of sulphate of iron, ℥xij; sulphuric acid, ℥j, and gr. xxx; nitric acid, gr. ccclx. It is of a syrupy consistence and a ruby-red or dark brown color, no odor or acrid taste, but possesses powerful astringent properties. When employed for the arrest of alveolar hemorrhage from tooth-extraction it is liable to cause sloughing of the bleeding tissues, and if used it should be in weak solution, and carefully watched.

Powdered Subsulphate of Iron.—Pulvis Ferri Subsulphatis—Monsel's Powder—is in the form of a yellow powder, and possesses the same astringent and other properties as the solution, and is applied as a styptic in alveolar hemorrhage with much greater convenience than the liquid form.

Medical Properties and Action.—Monsel's solution and powder act topically as powerful astringents and mild caustics, and are considered to be among the best styptics in use. These styptics combine with albumen and form a pale yellow compound, and on this property depends their chemical action on the tissues of the body. Internally administered, they act like the sulphate of iron, their remote effect being tonic and hemostatic. In small doses they exert an astringent effect on the gastro-intestinal mucous membrane, diminishing the quantity of fluids secreted or exhaled; hence their continued use will cause constipation.

Monsel's preparations of iron are principally used externally for hemorrhage from bleeding vessels. When employed internally it is for the arrest of hemorrhage from remote organs.

Therapeutic Uses.—The solution and powder of the subsulphate of iron are used internally for hemorrhage from the stomach and bowels. Externally, for hemorrhage, varicose ulcers, etc., etc.

Dose.—Of the solution of subsulphate of iron, gtt. v to gtt. x, twice a day in some bitter infusion. Of the powdered subsulphate of iron the dose is gr. v to gr. xv. The solution is also given in small doses with the sulphate of magnesia, and as an artificial chalybeate purging water.

Dental Uses.—In dental practice, Monsel's solution and powder are the forms that have been employed for arresting hemorrhage following the extraction of teeth, hemorrhage from leech bites, and also from other causes, such as wounds of the gums and mucous membrane, in the treatment of ulcers of the mouth; and

the solution, diluted with water, forms a serviceable application for abraded and inflamed mucous surfaces. Monse's solution of persulfate of iron, however, is not considered to be a reliable styptic for use in the mouth, as tannic acid, the 25 per cent. ethereal solution of hydrogen dioxide or the adrenal chloride are more efficient.

Dialysed iron is suggested as a local application for soreness of teeth following devitalization by arsenious acid, and removal of pulp, the root canal also packed with cotton, moistened with the iron preparation. It is an antidote for arsenious acid, and is locally applied after the removal of arsenical devitalizing mixtures, with good effects.

For Hemorrhage following the Extraction of Teeth.—After carefully cleansing the bleeding cavity as thoroughly as possible, the styptic should be applied on a pellet of cotton, or, in case the powdered subsulphate of iron is employed, on a pellet of cotton previously dipped in sandarach varnish, to which the powder will adhere, and inserted over the mouth of the bleeding vessel at the apex of the alveolar cavity. Cotton should then be inserted over the styptic preparation, and the alveolar cavity be thoroughly filled up. If necessary, a compress, made from a cork, or softened modeling composition, should be applied over the cotton filling the cavity and held in place by the opposing teeth, when the mouth is closed.

DENTAL FORMULÆ.

As a Preventive of Possible Blood Infection.

Dr. Burchard.

℞ Hydrargyri bichloridi . . . . . gr. j
Tinct. ferri chloridi . . . . . f. ℥j. M.
Sig.—Twenty drops in water four times a day.

For Hemorrhage after Lancing Gums of Children.

Dr. J. W. White.

Where oozing of blood persists in spite of local treatment
℞ Tinct. ferri chloridi . . . . . f℥ss
Acid acetic dil. . . . . f℥j
Liq. ammonii acet. . . . . f℥j
Ext. ergot. fld. . . . . f℥ij
Syr. simp. . . . . f℥ss
Aquæ q. s. ad. . . . . f℥iij. M.
Signa.—A teaspoonful every 3 hours for a child 6 months old.

FORMALDEHYDE—FORMALIN.

Derivation.—Formaldehyde is in the form of a gas obtained by the oxydation of methyl alcohol, and ranks with corrosive sublimate in its powerful disinfectant property. For medicinal purposes formaldehyde is employed in aqueous solution. It has the chemical property of uniting with sulphuretted or nitrogenous products of decay, fermentation or decomposition, forming true chemical compounds which are odorless and sterile, and in most cases antiseptic; hence it is from this property of combining with albuminous or nitrogenous bodies, that formaldehyde derives its germicidal and bactericidal powers, since bacteria are not only albuminous in character, but their food is mainly albuminoid. When formaldehyde is present it combines with both the bacteria and their food and destroys them.

Medicinal Properties, etc.—The germicidal and antiseptic action of formaldehyde was demonstrated by Low, Aronson, Berlioz and Frillat; also by I. Stahl, who found that formalin is equal in germicidal power to corrosive sublimate, and under certain conditions superior where albuminoid solutions are concerned. In large rooms a 2.5 volume per cent. of formalin in the air destroyed all micro-organisms in a quarter of an hour. When allowed to evaporate in the presence of wool, gauze-bandages, or other dressing material, the vapors of formalin condensed upon the fabrics in solid form (paraformalin) and so disinfected them. Hence dressing materials impregnated with formalin become perfectly sterile, and can immediately be used as antiseptic dressing. The vapor from the spray by a steam atomizer above the patient's head has proven efficient in whooping-cough and chronic bronchitis.

Formaldehyde is relatively non-poisonous, but when brought in contact with the skin, undiluted, causes a tanning effect, making it impermeable, and finally causing necrosis. This action is due to the property formalin possesses of readily penetrating living and dead tissue, and combining with it. Formalin readily and quickly influences both albumin and gelatine, changing them into a tough coagulum which does not lose its form, and possesses persistent antiseptic properties for certain micro-organisms.

Formalin attacks only the substance of the contagious material, leaving intact the articles treated, whether of organic or inorganic nature. It is also very readily employed under all circumstances, either in liquid or gaseous form. Its specific gravity closely approximates that of air, hence its power of keeping the atmosphere of an enclosed space uniformly impregnated with formalin vapor. Inhaled in quantity, formalin has marked toxic properties.

Therapeutic Uses.—Formaldehyde is a very reliable and useful germicide, antiseptic, and disinfectant. It is non-toxic, active, and permanent, and has no destructive action on vegetable or animal substances when locally applied in the form of formalin. Being of low specific gravity, the vapor of formaldehyde mixes readily with the air, and possesses more penetrating power in loose fabrics than any other germicide. Its activity as a germicide closely approaches, if it does not equal, that of corrosive sublimate. In the strength of 1 to 2,000 it is used in place of the bichloride of mercury for injections in large cavities, etc.

Formalin is the 40 per cent. solution of formaldehyde gas in water, a stronger solution being unstable (CH_2O). It is a colorless, neutral, volatile liquid with a pungent odor and somewhat irritating taste. It combines with all proportions of water. Taken internally in small doses it does not produceany toxic effect. Applied to vital tissues, formalin is penetrating and irritant, and, as it does not coagulate albumen, a weaker solution than 40 per cent. must be employed, as such a strong solution cannot be applied to the soft tissues as an antiseptic. Its one per cent. solution will destroy bacteria in about one hour, and its two per cent. solution will effectually sterilize instruments. To sterilize the hands the two per cent. solution is used, followed by alcohol.

Dental Uses.—In dental practice, formalin is employed as an antiseptic and deodorizer in the treatment of putrescent pulps, alveolar abscesses, etc. Also as a local application to ulcers of the mouth, abrasions, etc. One and a half or two per cent. solutions are used as gargles and mouth-washes; also, two and one-half per cent. solutions for ulcers, skin diseases, etc. To make a one per cent. solution, one part of formalin is added to 40 parts of water (1 oz. to 2 1/2 pints). For sterilizing cavities in teeth, a

stronger per cent. solution of formalin is very effective, and more especially if the cavity is large, or any decomposed dentine is allowed to remain as a covering to the pulp. It is also serviceable in putrescent canals, and for rendering devitalized pulps hard and leathery after the action of arsenious acid; in such cases a 20 per cent. solution is applied on cotton and permitted to remain for three to six days. For pulp-exposure a 2 per cent. solution may be applied before capping. While non-toxic, it requires care in its use, as it is an intense irritant to flesh. A 2 per cent. solution will also remove putrescent pulp-odor from the fingers.

Paraform, or polymerized formaldehyde, is a colorless crystalline powder, insoluble in water, which when heated gives off formaldehyde gas. This gas is recommended by Dr. H. O. Reik as an excellent sterilizer of instruments, napkins, towels, etc. Paraform pastilles are placed in a small air-tight chamber together with the articles to be sterilized, and formaldehyde gas liberated by means of an alcohol lamp placed underneath.

Glutol is a compound of formaldehyde and gelatin, in the form of a powder, which is antiseptic, and while it dries the surface of wounds and ulcers, seals them and renders them sterile. It is an efficient dressing for burns.

GAULTHERIA—WINTERGREEN.

PARTRIDGE BERRY—TEA BERRY.

Source.—Gaultheria is obtained from the leaves of the *gaultheriæ procumbens* (Ericaceæ), a small plant common to the woods of North America. The leaves contain a volatile oil, arbutin, urson, ericolin, tannic acid, etc., and the taste is aromatic, somewhat bitter, and astringent. The volatile oil consists principally of gaultheriline and methyl salicylate, which yield a pure salicylic acid.

Oleum Gaultheriæ.—The oil of gaultheria is antiseptic and antipyretic, and is administered in doses of ♏x–xx in articular rheumatism, and locally is used as an antiseptic in wounds and cystitis. The spirit of gaultheria—*spiritus gaultheriæ*—is used for flavoring. The infusion is used as a gelactagogue and em-

menagogue, and is often added to liniments for rheumatic pains and swollen joints.

Dental Uses.—The oil of gaultheria, one of the essential oils, is used in dental practice as an antiseptic, either alone or more generally in combination with other agents in the treatment of putrid root canals, alveolar abscesses, etc., and as an ingredient of local anæsthetic mixtures.

DENTAL FORMULÆ.

For Abscesses and Putrid Root Canals.

DR. BLACK.

℞ Carbolic acid (melted crystals) . . . . 1 part
Oil of cassia . . . . 2 parts
Oil of gaultheria . . 3 parts. ℿ.
This is the 1, 2, 3, mixture.

Local Anæsthetic.

DR. KAY.

℞ Ol. gaultheriæ . . . . . ℥ij
Chloroformi . . . . . ℥j
Ether sulph . . . . . ℥j
Chloral hydrat. . . . . ℥ij
Ol. caryophylii . . . . ℥iv
Alcoholis . . . . . ℥iss.
SIGNA.—Apply with cotton pressed upon each side of the tooth.

GELSEMIUM—YELLOW JASMINE.

Source.—Gelsemium is obtained from the root of the *gelsemium sempervirens*—yellow jasmine—woodbine, belonging to the natural order Apocynaceæ, which grows plentifully in the southern United States. The root is of a brownish color externally, and a grayish color within, and is sold in small pieces, from one-half to two inches in length, and a quarter of an inch in thickness, being hard and slightly cracked longitudinally. It has a bitter tase, and an aromatic odor, somewhat like that of green tea.

Medical Properties and Action.—Gelsemium has a depressing and sedative influence upon the nervous centres, and diminishes the force and frequency of the heart's action. It contains a very powerful alkaloid, *gelsemia* or *gelsemina*, which is colorless, odorless, with an intensely bitter taste.

Gelsemium, in moderate doses, causes a languid feeling, attended with mental calmness, slow action of the heart, drooping eyelids, dilatation of the pupil, and some feebleness of muscular movements. In larger doses it causes vertigo, double vision, am-

blyopia, paralysis of the muscle that elevates the upper eyelid, so that it cannot be raised, dilated pupil, labored respiration, on account of its effect upon the respiratory muscles, slow and feeble movement of the heart, great muscular weakness, and a reduced sensibility to pain and touch. Such effects occur about half an hour after the gelsemium is taken, and continue for two or three hours, when they disappear.

When poisonous doses are taken, all of the symptoms described above occur in a more intense degree, and there is first an unsteady gait, until all muscular power is lost, the lower jaw drops, the muscles of the tongue are paralyzed, speech being impossible, the respirations are very labored, slight and irregular, and the action of the heart weak, feeble and intermittent, and generally the skin is covered with a profuse perspiration. Death occurs from asphyxia, but consciousness is preserved until near the end, which is generally calm, and not disturbed by convulsions.

Therapeutic Uses.—Gelsemium is internally administered in tetanus, mania, convulsive or spasmodic cough, such as whooping-cough, pneumonia, remittent and typho-malarial fevers, ovarian and other forms of neuralgia, cerebro-spinal meningitis, pleuritis, etc., etc.

Dose.—Of the fluid extract of gelsemium—*Extractum Gelsemii Fluidum*—the only officinal preparation, ♏v to ♏xv. Of the tincture of gelsemium—*Tinctura Gelsemii*—(gelsemium ℥iv, alcohol, Oj) the dose is gtt. x to gtt. xx. The fluid extract is preferable for administration; but one fluidrachm of this has caused death. Dose of the alkaloid *gelsemia*, gr. 1/60 to gr. 1/20.

Dental Uses.—Gelsemium is greatly extolled as a remedy for neuralgia of the fifth nerve, often affording permanent relief, especially when the affection is associated with diseased teeth. The dose may be repeated at any time after an hour and a half, if the pain is not relieved; a third dose is seldom required. In neuralgia of the face or head, three-minim doses of the tincture of gelsemium every half hour, will often act very beneficially, and leave no ill effects. Owing to the toxic effects of this drug, care is necessary that the dose is a moderate one, and the symptoms carefully observed.

DENTAL FORMULÆ.

For Neuralgia from Devitalized Teeth.

℞ Tinct. gelsemii . . . gtt.x
Tinct. aconiti . . . . gtt.v
Aquæ . . . . . ℥iv. M.

SIGNA.—One teaspoonful every hour.

For Odontalgia, Internal Remedy.
DR. DUNOYCER.

℞ Gelsemium . . . . 1 milligr.
Aconitine(cryst.) . 1/4 milligr.
Valerianate of quinine 5 centigr.
For one pill.

SIGNA.—Give 1 to 3 pills to an adult in the 24 hours.

For Odontalgia.

℞ Tinct. gelsemii . . . ♏xv
Tinct. ferri perchlori ♏x
Syr. aurantii . . . . ℥ss
Aquæ . . . . . ad. ℥j. M.

SIGNA.—For 1 dose. To be repeated thrice daily.

GLYCERINUM—GLYCERINE.

Formula.—$C_3H_5(OH)_3$. Sp. gr. 1.25.

Source.—Glycerine is obtained from the saponification or decomposition of fats and fixed oils, and contains a small percentage of water. It is a colorless, inodorous, syrupy liquid, of a sweet taste, and freely soluble in water and alcohol, but not in ether or chloroform. It has such an affinity for water that it is capable of absorbing fifty per cent. of its own weight.

Medical Properties and Action.—Glycerine is nutrient and emollient, possessing considerable power as a solvent and preservative. The addition of 1/4, 1/8, or even 1/16 part of glycerine to a lotion or poultice, or an external application, renders it particularly emollient and soothing. It keeps the parts moistened and soft, and corrects or prevents the disagreeable odor of discharges, and it does not evaporate or dry at an ordinary temperature. Glycerine dissolves carbolic acid, creasote, tannic acid, borax, iodine, quinine, iodide of potassium, gallic acid, etc., and its uses as a solvent and a vehicle for other remedies are very numerous. It has been prescribed as a substitute for cod-liver oil, where the latter nauseates. It is also classed among antiseptics. Officinal solutions of medicinal agents in glycerine are known as glycerites (glycerita). Glycerine should never be combined with nitric, sulphuric or chromic acids, permanganate of potassium or chlorinated lime on account of the explosive results.

Therapeutic Uses.—Glycerine is rarely used alone as an internal remedy, its chief use being external, or in combination with other medicinal substances. It has been prescribed in phthisis, diabetes, acne; externally, as an emollient in acute coryza, chronic follicular pharyngitis, chapped hands and face, fissures, skin diseases, dressing for wounds and ulcerated surfaces, and as a vehicle for the application of astringents to the eye; also to soften cerumen and for the removal of insects from the ear, and for diminishing the secretion of pus; also in burns, abraded surfaces, erysipelas, etc. It has also been employed in smallpox as an emollient and to prevent pitting, a mixture of one part of glycerine and two parts of rose water being applied, after the pustules have broken and the discharge has commenced to dry. It should be applied for a few days until the scabs begin to loosen. Glycerine is also used in croup, locally applied to the glottis; also in deafness, where the auditory canal is dry and inelastic. For an emollient application it is frequently combined with other agents, and used in the form of an ointment or embrocation. Five parts of glycerine rubbed up in a mortar with four parts of yolk of egg, forms a compound which prevents the action of the air on irritated broken or abraded surfaces, and is soothing in erysipelas, cutaneous affections, etc. Although glycerine is so bland in its general character, yet it produces a smarting sensation when first applied to an abraded surface of the skin; such an effect is thought to be due to the affinity of glycerine for moisture, which it abstracts from the skin so rapidly as to cause the smarting sensation; mixing the glycerine with a little water will obviate this. Pure glycerin, when mixed with water, will raise the temperature eight or ten degrees, and hence the two should be combined previous to the application.

Dose.—Of glycerin, ℥j to ℥ij.

Dental Uses.—Glycerine is a useful agent in dental practice as a solvent and emollient, as a solvent alone, and as both solvent and emollient, when combined with other substances.

It is employed with great benefit in such diseases of the mucous membrane of the mouth, as the different forms of stomatitis, ulcers of the mouth, aphthæ, alveolar abscess, abraded surfaces from the irritation of acrid substances, artificial teeth, etc.

In the treatment of inflamed and ulcerated conditions of

the mucous membrane, it is frequently combined with borax, and for chronic alveolar abscess, after the use of more active agents, and diseases of mucous membrane, it is combined with carbolic acid, iodine, sulphite of soda, etc. As an anodyne and emollient application, glycerine is combined with morphine, atropine, acetate of lead, etc., etc. To form ointments and embrocations, it is combined with gum tragacanth, lime water, oil of almonds, rose water, etc., etc.

DENTAL FORMULÆ.

For Chronic Abscess, Ulcerations, etc.

℞ Glycerini . . . . . ℥j
Tinct. iodi. comp. . . ♏xlv
Acidi carbolici cryst. ♏vj
Aquæ destillatæ . . . ℥v. M.
SIGNA.—Apply as a lotion or injection.

For Inflammation and Ulceration of the Mucous Membrane.

℞ Glycerini . . . . . ℥j
Sodii boratis . . . . ʒij. M.
SIGNA.—Apply as a lotion.

For Aphthous Ulceration of the Mouth.

℞ Glycerini . . . . . ℥j
Sodii sulphitis . . . ʒj
SIGNA.—Apply as a lotion.

For Aphthous Sore Mouth of Infants.

℞ Glycerini,
Aquæ . . . . . āā ℥ss
Sodium sulph. . . gr.xxx. M.
SIGNA.—Use on swab, every 2 hours.

For Chronic Alveolar Abscess, Ulceration of Mucous Membrane, etc.

℞ Glycerini . . . . . partem 1
Acidi tannici . . . . partes 2

For Pulpitis.

℞ Glycerini . . . . . gtt.ij
Acidi carbolici . . . gr.v
Tr. aconit. rad.,
Aq. menth. pip. . āā gtt.ij
Acidi tannici . . . . gr.j
Ol. menth. pip.,
Ol. caryophilli . āā gtt.xxv. M.
SIGNA.—Apply on cotton.

For a Sedative Application in Inflamed Mucous Membrane.

℞ Glycerini,
Chloroformi . . . āā ℥ss. M.
SIGNA.—Apply as a lotion.

For Pulp Canals of Abscessed Teeth.
FAUGHT.

℞ Glycerini . . . . . fʒij
Acidi tannici . . . . ʒij
Morphiæ acetatis . . ʒj
Iodoformi . . . . . ℈j. M.
SIGNA.—Apply on floss-silk or cotton.

GLYCOZONE.

Derivation.—Glycozone is composed of chemically pure glycerine and peroxide of hydrogen. When these two preparations are combined, the result is a stable compound owing to

the reaction that takes place when chemically pure glycerine is submitted, under certain conditions, to the action of fifteen times its own volume of ozone, under normal atmospheric pressure at a temperature of 0° C. The glycerine thus employed must be chemically pure, as the pressure of the water or other foreign matter in it produces in the resulting compound formic acid, glyceric acid, and other secondary products that have an injurious effect on animal tissue. Glycozone possesses a pleasant, sweetish taste, and causes a feeling of warmth when it comes in contact with the mouth or stomach.

Medical Properties and Action.—Glycozone excites the salivary glands to increased action and simulates the gastric secretions. It attracts to itself water from the adjacent tissues, but not sufficient to cause injury, a property due to the glycerine it contains. In excessive doses of one or two ounces, glycozone causes epigastric uneasiness, followed by loose, copious, watery stools, which are accompanied by severe cramps. It appears to have no effect upon the kidneys, liver or heart. It is slowly decomposed in the stomach, ozone being liberated and the glycerine uniting with the water from the tissues. It is supposed that the morbid elements with which it comes in contact hasten this decomposition, and in so doing are themselves oxidized and destroyed. The presence of free ozone in the stomach resulting from the decomposition of glycozone aids the digestive process. Glycozone must be kept in tightly-corked bottles, glass-stoppered are best, and when thus protected, it will not deteriorate at a temperature of even 110° F. No metallic instruments should be brought in contact with it, as such contact decomposes it; hence glass or hard-rubber vessels and syringes, are necessary when using it. It resembles peroxide of hydrogen in producing a powerful oxidizing effect, although its action may not be as rapid or as energetic as the latter compound; therefore it cannot be safely combined with other drugs or chemical substances when prescribing it.

Therapeutic Uses.—Glycozone is employed in the treatment of gastric ulcer, affections of the stomach, catarrh, chronic alcoholism, chronic gastric catarrh from other causes, and atonic and acid dyspepsia. Externally—when a diseased or suppurating surface is cleansed by peroxide of hydrogen, the application

of glycozone stimulates healthy action and promotes recovery. It also checks the discharge of irritating secretions, and prevents infection from pathogenic organisms, by acting as a powerful antiseptic and stimulant. It is also useful in follicular pharyngitis, and chronic coryza, and croup.

For diphtheria a tablespoonful of glycozone may be given in a wine-glassful of water every three hours with excellent effects; it is harmless. For membranous croup, after spraying the nose, throat, larynx and pharynx copiously every two hours or so with a mixture of peroxide of hydrogen with 4 to 6 ounces of water, the membranes are destroyed, and then one teaspoonful of glycozone, diluted in a wine-glass of water and given three times a day, will prevent any disturbance of the stomach, and will regulate the bowels. In ulceration and chronic inflammation of the intestines, great benefit is derived from enemata consisting of glycozone ℥j, and lukewarm water ℥xij, prepared just before using; also in fistula-in-ano and rectal ulcerations glycozone ℥j and lukewarm water ℥j, administered once or twice daily, will produce good results. For leucorrhœa, the vagina is first washed with peroxide of hydrogen one part and water four parts, when glycozone is applied on small rolls of lint, or absorbent cotton, and the procedure repeated twice daily.

Dental Uses.—Glycozone is employed for all forms of inflammation and ulceration of the oral mucous membrane, and in ulcerative stomatitis frequent applications proving very beneficial. It is also considered to be useful in the chronic form of alveolar abscess in the form of an injection composed of glycozone and lukewarm water.

HAMAMELIS.

WITCH HAZEL.

Source.—Hamamelis Virginica is an indigenous shrub, common to all parts of the United States and Canada, and usually found in stony places and on the banks of streams. The bark and leaves are the medicinal portions, the leaves being collected in autum.

Medical Properties and Action.—It is tonic, astringent, sedative and anodyne. The bark has a bitter, astringent, and somewhat

sweetish and pungent taste, and was first employed by the Indians as a sedative and discutient application, in painful tumors and other cases of superficial inflammation. The bark contains from eight to ten per cent. of tannic acid, and also a bitter principle.

Therapeutic Uses.—Hamamelis Virginica, although not until recently officinal, has for some time been employed in hemorrhage of the lungs, hæmatemesis, and in phthisis. Externally, it is applied to tumors, inflamed and painful parts, etc., etc., in the form of a fluid extract, decoction and tincture. Two minims of the tincture of hamamelis every half hour, will often control hemorrhages from nose, uterus and from hemorrhoids.

Dose.—Of the fluid extract of hamamelis, ℥ss to ℥ij; of the decoction ℥ss to ℥j.

Dental Uses.—Hamamelis is employed in dental practice as a sedative or anodyne application, in incipient periodontitis, in the form of the fluid extract, applied *warm* on lint or cotton as a lotion; also as an anodyne, to irritated and painful exposed pulps of teeth; also for passive hemorrhage from the mucous membrane of the mouth; also for the soreness arising from the removal and effects of salivary calculus. The tincture may be applied as a sedative lotion, in the proportion of one part to ten of water.

HYDRARGYRUM—MERCURY.

QUICKSILVER.

Symbol.—Hg. Sp. gr. 13.5.

Sources.—Mercury is a metal of a nearly silver-white color, and a very high degree of lustre. It is liquid at all ordinary temperatures, and only solidifies when cooled to 39° or 40° F. It boils at about 660° F., it is malleable at 40° F., and is slightly volatile at 60° F.; when boiling it yields a transparent, colorless vapor, of density of 100. It also volatilizes somewhat even at ordinary temperatures, and especially above 68° F. The ordinary ore from which metallic mercury is obtained is the *mercuric sulphide*, although it is occasionally met with in globules disseminated through this native sulphide. There is also a form known as *horn silver*, or native calomel, and a native amalgam of silver and

mercury. California furnishes metallic mercury of a peculiar purity, in large quantities. The metal is obtained from the sulphide by the process of "roasting." When pure, metallic mercury does not readily tarnish in the air, and has neither taste nor smell, and it can be purified by re-distillation, or by adding to it a small quantity of a strong solution of nitrate of mercury.

The impurities are generally dirt, dust, lead, tin, bismuth or zinc. The tarnishing of mercury implies the presence of other metals.

It is used as mercury in medicine in the form of ointment, plaster, gray powder, and blue mass. All preparations of mercury yield to absorption and after absorption to elimination, the rapidity of both depending to a great extent on the variety of it given. According to Prof. H. C. Wood, a single dose of mercury does not remain in the system, but when the drug is administered constantly for a length of time, the elimination does not keep pace with the absorption, so that the mercury accumulates in the tissues; also that the elimination is irregular and intermittent, and there is no limit of time during which the accumulated mercury may remain in the body, and that all probabilities point to the possibility of mercury being deposited in the tissues in such a form that it is practically inert and exerts no effect upon the system; it is liable, however, under certain agencies, to be set free and to exert its power upon the general nutrition.

Dental Uses.—Metallic mercury is employed in dental practice as an ingredient of amalgam filling material, being combined for such a purpose with silver, tin and zinc, and sometimes with gold and platinum, in addition to the other metals named.

HYDRARGYRI CHLORIDUM CORROSIVUM.—*Corrosive Chloride of Mercury—Corrosive Sublimate. Mercuric Chloride, Bichloride of Mercury. Formula,* $HgCl_2$.

Derivation.—Corrosive sublimate is obtained by subliming a mixture of chloride of sodium and mercuric sulphate, the latter made by boiling together sulphuric acid and mercury; double decomposition takes places, forming mercuric chloride and sulphate of sodium. Corrosive sublimate is in the form of colorless crystals, or crystalline masses, which are inodorous, fusible and sublime without residue, and of an acrid, styptic taste. It is readily soluble in 15 parts of water, 7 parts of alcohol, and ether.

Medical Properties and Action.—It is one of the most active salts of mercury, and is a corrosive poison, but the therapeutic dose now used is less liable to cause the disagreeable and dangerous effects of mercury than almost any other preparation employed for the same purposes. It is in the form of colorless crystals, and is entirely soluble in water. Corrosive sublimate is an effective germicide in the strength of one part to 2500 parts of water, being 250 times more powerful than carbolic acid. An aqueous solution of 1 in 20,000 destroys the spores of bacilli in ten minutes, and a solution of 1–5000 is a certain disinfectant, when the exposure is very short, and it is now regarded as one of the most powerful germicides in use and is very extensively employed in antiseptic surgery; but it should be noted, however, that where albumen is present the bichloride is decomposed and rendered inert. The same occurs when solutions are permitted to stand for some time even when distilled water is used as a solvent. The addition of a weak acid, tartaric, or chloride of sodium, will prevent such decomposition. The bichloride, according to Koch, is efficacious as a germicide in a watery solution of 1–50,000.

Dr. F. Abbott regarded the bichloride of mercury as being the simplest antiseptic in use. Dr. W. D. Miller, of Berlin, also testifies to the power of the bichloride as an antiseptic in the treatment of the oral cavity as follows: "The experiments show that bichloride of mercury is about two hundred times as powerful as carbolic acid, and demonstrates very clearly the mistake of substituting weak solutions of this antiseptic (1–1000, as I have seen recommended) for concentrated carbolic acid. One one-thousandth is only one-fifth as powerful as pure carbolic acid, which in many cases may be used with impunity. It is consequently useless to attempt to introduce the sublimate solution for the purpose of sterilizing root-canals, cavities before filling, etc., unless we may use at least a 1/2 per cent., if not a one per cent. solution. I see no reason why this may not be done. In a few cases I have used a 1 per cent. solution for treating root-canals, and do not hesitate, particularly with the rubber dam adjusted, to wipe out cavities before filling with a two per cent. solution, and see no possible evil which would result from it." "As a mouth wash I have frequently used a 1 per cent. (1.000) solution

myself, and have seen no bad results from it; I would not, however, recommend it to my patients in this strength."

The solution in water, 1 part to 2000, will approximate 1 grain to 4 1/2 ounces of water.

Dr. Black recommends the following combination: Mercuric chloride, gr. ij; peroxide of hydrogen, f℥j. M. For use as an injection in alveolar abscess and the pus pockets of pyorrhœa alveolaris. As a solution of bichloride of mercury is prone to undergo chemical changes, powders or tablets containing equal quantities of the bichloride and ammonium chloride may be prepared and a solution made by adding one of these to an ounce of distilled water.

Another method is to take one drachm each of the bichloride and hydrochloric acid, and add enough of distilled water to make one ounce, which forms a permanent solution, strong enough in the proportion of a teaspoonful to a pint of water, to make a sterilizing and disinfectant solution of 1 to 1000, for washing out pus sacs and pus pockets in alveolar abscess and alveolar pyorrhœa.

Referring to the bichloride of mercury, benzoic and salicylic acids and listerine, Dr. Miller says: Of these four, which are available for the prophylactic treatment of the oral cavity, particularly of the teeth, the bichloride is, without doubt, the most effective, because its action continues longer; and he further says: "Unfortunately the bichloride of mercury possesses one great disadvantage in its highly poisonous character. It seems, however, scarcely possible that any harm could result from its use in so dilute a form." (See Hydrargyri Chloridum Mite.)

Passing chlorine through an alcoholic solution of chloride of mercury will prevent the decomposition of the latter when exposed to light, or any change, by loss of chlorine, to mercurous chloride.

Therapeutic Uses.—Corrosive sublimate is alterative in small doses, and in large quantities it is a powerful irritant poison, corroding the stomach and causing death in a very few hours. Its continued use has caused salivation, but it has a less tendency to produce such an effect than the other preparations of mercury. Internally it is employed in secondary syphilis, chronic diarrhœa and dysentery. Externally in diseases of the eye, diseases of the

skin, ulcers, gonorrhœa and gleet, etc., etc. The external application to large surfaces is dangerous. Its use is contra-indicated in patients affected with pulmonary disease. Drs. Yates and Kingsford report three cases of cancrum oris in children cured by wiping the affected parts with a solution of the bichloride of mercury (1 to 500), and afterwards dressing them with lint soaked in a similar solution (1 to 1000). Healthy granulations soon made their appearance, and the wound quickly contracted.

For cases of poisoning the antidotes are albumen, white of egg, wheat flour, milk, etc.

Dose.—Of corrosive sublimate gr. 1/30 to gr. 1/10, in pill or solution.

Dental Uses.—In addition to what has already been stated in regard to the dental uses of bichloride of mercury, it is employed as a lotion, injection or gargle, in chronic diseases of the mucous membrane, ulcers, ulitis, etc. Dr. C. T. Stockwell reports a case of acute ulitis in which bichloride of mercury, in solution 1–1000, was used to bathe the parts, and the pockets about the teeth injected with it, the result being very satisfactory; and the same solution used as a sterilizing agent is considered to be very efficient. For sterilizing cavities and root-canals of the teeth it is a valuable and efficient antiseptic and germicide; also weak solutions are useful for treating abscess, ulcers. When used as a sterilizing agent, the rubber-dam should be adjusted previous to its application.

Test for Bichloride of Mercury.—Dr. Chas. Mayr recommends the following to determine whether a solution of bichloride of mercury is still reliable or not: Saturate a nice grade of paper with a solution of a given amount of iodide of potassium in water; with the proper gauging of this solution, after it has dried on the paper, a drop of the solution of the bichloride (1 to 500) will produce a scarlet spot when dropped on the paper; a solution of 1 to 1000, a yellow spot; a more dilute solution, no spot at all. To obtain this result, a certain strength of the solution of iodide of potash gauged for the paper to be used is required. The solution of iodide of potash should be made slightly alkaline, which will prevent, to a great extent, the paper from turning blue. Diluting a solution of bichloride of mercury with lime water will remove the disagreeable taste.

DENTAL FORMULÆ.

For Chronic Alveolar Pyorrhœa.

DR. A. W. HARLAN.

℞ Hydrarg. bichlor. . . grs.ij
Acidi tartarici . . . grs.x
Aquæ destillatæ . . . f℥iv. M.

SIGNA.—First cleanse with injections of peroxide or hydrogen, and then inject the above with a hypodermic syringe.

Antiseptic Solution.

EMIL ROTTER.

℞ Corrosive sublimate, 1 to 20,000 . . . . gr.j
Sodii chlorid. . . . . gr.vss
Acid, carbolic . . . gr.xxx
Zinci chlorid.,
Zinci carbolat. . . āā ℥j 1/4
Acid, boric . . . . gr.xl
Acid, salicylic . . . gr.x
Thymoli . . . . . ♏ij
Acid, citric . . . . gr.ij
Aquæ . . q.s. ad. 1,000.00. M.

Said to be powerful, yet not toxic to any dangerous extent, and to have a more potent effect on pyrogenic microbes than sublimate in solutions of 1 to 1000. If a weak solution is desired the sublimate and carbolic acid may be omitted.

Antiseptic and Stimulant Mouth-wash.

(For use especially in Alveolar Pyorrhœa.)

DR. CHAS. B. ATKINSON.

℞ Hydrarg. bichlor. . . gr.ij
Tinct. calendulæ . . ℥iv
Aquæ dest. q. s; ad. . ℥viij. M.
SIGNA.—Use daily.

To Disinfect Softened Dentine in Cavities.

DR. A. W. HARLAN.

℞ Hydrarg. bichlor. . . gr.ij.
Hydrogen perox. . . ℥j
Acidi tartarici . . . ♏v. M.

Aqueous solutions of Labarraque's solution, permanganate of potash of boro-glycerine, may also answer.

Prof. W. D. Miller, of Berlin, in a list of remedies with which he made careful experiments, places the relative powers of well-known agents in preventing the development of fungi as follows;

Bichloride of mercury	1–100,000
Peroxide of hydrogen	1– 50,000
Iodine	1– 6,000
Iodoform	1– 5,000
Salicylic acid . . .	1– 2,000
Eucalyptus	1– 1,600
Carbolic acid	1– 1,500
Chloride of zinc	1– 1,250
Permanganate of potash	1– 1,000
Listerine	1– 120

HYDRARGYRI CHLORIDUM MITE—*Mild Chloride of Mercury.*

Calomel. Monochloride of Mercury. Formula.—HgCl.

Derivation.—Calomel is obtained by subliming a mixture of mercurous sulphate and chloride of sodium, a double decomposition taking place, by which mercurous chloride and sulphate of

sodium are formed. The mercurious sulphate thus employed is obtained by boiling mercury in sulphuric acid and triturating the resulting mercuric sulphate with mercury.

To remove any corrosive sublimate which the calomel may contain, it is washed with hot distilled water until the absence of a white precipitate with ammonia shows that the poisonous ingredient has been removed. Calomel is in the form of a white, inodorous, tasteless powder, insoluble in water, alcohol and ether, and wholly volatilized by heat. Calomel is incompatible with the alkalies, and alkaline earths, and alkaline carbonates, with lead, copper and iron. When nitro-muriatic acid is combined with it, corrosive sublimate is formed; neither should it be given in combination with iodine.

Medical Properties and Action.—Calomel and the other mercurials are employed as alteratives, sialagogues, purgatives, diuretics, etc., and moderate doses increase the action of the secreting glands and organs, stimulating the salivary glands in a very decided manner. When large doses are administered the effects are manifested on the gums, which become tender and swollen, the salivary glands take on increased action, the saliva and buccal mucus flow profusely, the mucous membrane of the mouth becomes inflamed and ulcerated, the tongue swollen and the breath fetid, with a metallic, copper taste, and the teeth become loose; such symptoms constitute the condition known as salivation. When the use of the drug is discontinued these symptoms disappear, but the mucous membrane and gums are ever after more susceptible to irritation, and the stability of the teeth is more or less impaired, as is shown by the recession of the gums and the absorption of the alveolar processes. In many cases the gums, especially about the necks of the teeth, remain somewhat tumefied, with a tendency to ulceration.

If the use of the mercury is continued beyond the stage which the symptoms just described indicate, or even as the effects of small doses in persons very susceptible to the influence of mercury, an excessive salivation ensues, with serious ulceration of the gums and mucous membrane of the mouth, loss of the teeth, and even necrosis of the bones of the jaws. Mercury has also the effect of causing considerable emaciation, from the absorption of fat, and sometimes a peculiar febrile state known as mercurial

fever; and also diarrhœa, skin diseases, rheumatism, neuralgia and disorder of nervous system. Mercury, after it is absorbed, has a decided effect upon the blood, which it impoverishes, destroying the red blood globules (hematine and globuline); the blood contains more water, is more prone to putrefaction, and the unnatural fluidity predisposes to hemorrhage, which may become dangerous.

Blue Mass.—*Massa Hydrargyrum* contains 33 per cent. of metallic mercury, and is composed of mercury ℥ij, confection of rose ℥iij, and powdered liquorice root ℥j and is employed as an alterative, sialagogue, indirect tonic and cholagogue, and purgative in syphilis, diseases of the skin, bilious derangements, dyspepsia, acute glandular affections, diarrhœa and dysentery of infants, hepatic disorders, croup and membranous laryngitis, cholera, etc., etc.

Dose.—Of calomel, gr. 1/10 to gr. x; of blue pills, or mass, gr. ss to gr. xv. Mercurials are administered by the mouth, by inunction, by fumigation, and by the hypodermic method.

Mercurial Ointment—*Unguentum Hydrargyri.* Blue ointment is made by rubbing two parts of mercury with one part of suet and lard each, until the globules disappear. When rubbed into the skin, it produces the constitutional effects of mercury, and is applied to tumors, syphilitic sores, blistered surfaces, and is used to destroy pediculi, and also to prevent pitting in small-pox.

Mercury with Chalk.—*Hydrargyrum cum Creta*, a gray powder, consists of mercury, three parts, prepared chalk, five parts; it contains 38 per cent. of metallic mercury. It is a gentle laxative, when given in full doses, and is antacid, and employed chiefly as an alterative in infantile diarrhœa, etc.

Dose.—Of mercury with chalk, for adults, gr. v to xx; for children, gr. ss to ij, iij or x.

The effect of mercurial preparations upon children is sometimes very serious, as a profuse, or even gentle salivation will, at times, cause mortification and destruction of the bones of the jaw, the teeth, the cheek and lip; and although such cases may not be common, yet, to avoid such a powerful action, the gums should be frequently and carefully examined, when a course of such remedies is being pursued.

PROTIODIDE OF MERCURY—*Hydrargyrum Iodidum Viride* known also as Green Iodide of Mercury—is prepared by rubbing mercury and iodine together with the addition of a little alcohol. The formula is HgI, and it is in the form of a greenish-yellow powder, insoluble in water and alcohol, but soluble in ether. Exposure to the light partially decomposes it, when it becomes of a dark olive color.

Protiodide of mercury is internally administered in scrofula and scrofulous syphilis. It exercises a specific influence over the lymphatic and glandular system. It should never be given at the same time as iodide of potassium, as it converts it into biniodide and metallic mercury.

Dose.—Gr. 1/6 to j.

Externally, protiodide of mercury is applied, in the form of ointment, to syphilitic ulcers, acne, pityriasis, etc., etc.

BINIODIDE OF MERCURY—*Hydrargyri Iodidum Rubrum.*—Red Iodide of Mercury. Mercuric Iodide. A red powder which becomes yellow when heated and red again when cold. It is wholly volatilized by heat, and condenses in scales, which are first yellow, but afterwards red. It is insoluble in water, but soluble in boiling alcohol and solutions of iodide of potassium and chloride of sodium. Poisonous.

Dose.—Gr. 1/50 to 1/10. It is a powerful germicide.

RED SULPHURET OF MERCURY—*Hydrargyri Sulphidum Rubrum.*—Vermilion. Cinnabar. In brilliant crystalline masses of a deep-red color and fibrous texture. It is entirely volatilized by heat. It is not soluble in either nitric or muriatic acid, but a mixture of the two acids will dissolve it. Cases have been cited in support of the asserted poisonous effects of vermilion, where it has been used as a coloring matter for dental vulcanite, but a careful analysis as well as evidence based upon scientific investigation, fails to establish the truth of such a theory. Vulcanite composed only of pure caoutchouc and sulphur, known as "black vulcanite," possesses advantages over the red vulcanite, in being of finer texture, more dense, and less spongy, and consequently less liable to absorb and retain the secretions of the mouth, in the case of an artificial denture constructed of it.

DENTAL FORMULÆ.

For Diarrhœa of Dentition.

℞ Calomel . . . . . gr.ij ad vj
Cretæ ppt. . . . . gr.xviij
Ipecacuanhæ pulv. . gr.ij
Extract hyoscyami . gr.iij ad vj.
F. chart, No. vj.

SIGNA.—One every 2 or 3 hours according to circumstances.

For Febrile Excitement of Dentition.

℞ Calomel . . . . . gr.ij ad iij
Magnes, calc. . . . gr.xxiv
Ipecacuanhæ pulv. . gr. ij to iij
F. ch. No. xij.

SIGNA.—One to be given every 3 hours.

For Venereal Sore Mouth and Throat.

℞ Hydrar. chlor. corrosi gr.j
Mellis despumati . . f℥ss
Aquæ destillatæ . . . f℥iv. M.

SIGNA.—To be used as a gargle.

For Warts, Condylomata, etc.

℞ Hydrar. chlor. corrosi ℥j
Collodii . . . . . ℥j. Solve.

SIGNA.—To be applied as a caustic, with a camel's-hair brush.

For Diarrhœa of Teething Children.

℞ Hydrargyri cum cretæ,
Pulv. ipecac et opii . āā gr.j.
M.

SIGNA.—One powder.

IATROL.

Derivation.—Iatrol is obtained by a synthetical process from certain coal-tar derivatives, and possesses the combined properties of iodine, phenol and methylsalicylic acid.

Physical Properties.—Iatrol is an impalpable white powder, without odor, slightly astringent, of acrid taste, non-toxic, non-irritant, stainless; unaffected by ordinary conditions of light and heat, and does not decompose under the action of metalic oxides, salts of mercury, or alkalies. It is readily soluble in alcohol, ether and chloroform; but insoluble in cold water, glycerine, the fixed oils and vaseline. It is slightly soluble in warm water. It may, however, be incorporated with the insolubles mentioned, in the form of ointments, suppositories, etc.

Medical Properties and Action.—Iatrol is antiseptic, aseptic, astringent, antizymotic, germicide, cicatrizant and parasiticide; also, slightly anæsthetic (local). Internally, iatrol is antiseptic and possesses slight analgesic and antipyretic action. Externally it is applied in the form of a dry dusting powder, and promotes rapid healing of incised and lacerated wounds, burns and ulcers. It is also employed by insufflation, in catarrhal conditions of the ear, nose, and throat. It is also used in chancres, chancroids and

mucous patches with advantage. Internally iatrol is employed for fermentative conditions of the alimentary canal.

Dose.—Internally, gr. j to ij., either alone or combined with nux vomica, bismuth, or podophyllin.

Dental Uses.—Iatrol is employed as an antiseptic and germicide in all pathological conditions of the oral cavity where iodoform, iodol, aristol, etc., may be indicated. It is also incorporated in a dentifrice with satisfactory results. For mucous patches and ulcers of the mouth it possesses advantages over many other antiseptic and germicidal agents in being non-toxic, non-irritant, and odorless.

IODOFORMUM—IODOFORM.

TERIODIDE OF FORMYL.

Formula.—CHI_3.

Derivation.—Iodoform is a preparation of iodine, being obtained by the action of chlorinated lime upon an alcoholic solution of iodide of potassium, heated at 104° F., the product being iodoform and iodate of lime, the iodoform being separated by boiling alcohol. It is in the form of small, pearly crystals, of a lemon-yellow color, with an unpleasant odor, like that of saffron, and a sweetish taste, and soft to the touch. It is volatile, and soluble in 52 parts of alcohol, chloroform, and in 5.2 parts of ether and the fixed and volatile oils, but insoluble in water. It contains 96.7 per cent. of iodine.

Medical Properties and Physiological Action.—Iodoform has no irritant action, and, in small doses, is tonic, stimulant, anodyne, alterative and disinfectant, having great influence on the nervous system; it is also antiseptic, but is not a germicide, and although its germicidal action is practically nothing, it is extensively used in surgical practice. Its good effects upon the tissues of wounds are due to its protecting power both mechanically and by the dryness it maintains, when it is applied in the form of a powder. Although it will not destroy micro-organisms, yet it will destroy the toxic substances formed by micro-organisms. In large doses, it causes a form of intoxication, followed by convulsions and fatal effects. In the form of vapor, it possesses anæsthetic properties, but not equal to those of the general anæsthetics in common use.

It has also been used as a local anæsthetic, and also as an antiseptic. Its odor can be detected in the blood, the brain and the muscles.

Therapeutic Uses.—Iodoform produces the constitutional effects of iodine, but is chiefly used externally for painful cancerous and phagedenic ulcerations, irritable ulcers, ill-conditioned wounds, obstinate skin diseases, scrofulous glandular enlargements, to allay the pain of gout and neuralgia, and for phthisis, mixed with starch and spread on paper, so that the vapor may be inhaled. Dusted over a diseased surface, it allays pain and changes the morbid action. A saturated solution of iodoform in chloroform is recommended for neuralgia; also a saturated solution in any of the essential oils is used for the same affection. In the form of an ointment, it is used as an application to irritable ulcers. For ulcerated surfaces, it may be sprinkled over the part, and lint, coated with glycerine, applied as a dressing.

Dose.—Of iodoform, gr. j to gr. iij, three times a day, in the form of a pill.

Dental Uses.—Iodoform is highly recommended in dental practice not only as an antiseptic but as an anæsthetic, either alone, or what is better, combined with eucalyptus oil. It possesses no escharotic property sufficient to cause irritation or the destruction of parts. In the treatment of alveolar abscess, iodoform, in combination with oil of eucalyptus, has given great satisfaction; also in cases of putrescent pulps applied as an injection. It is recommended to be used as follows: First, an injection of eucalyptus oil, followed by the introduction of the mixture of iodoform and eucalyptus into the root canal, on cotton, or on a strand of floss-silk, which is charged by first dipping it into the oil, and then into the iodoform; or the two may be combined in a solution (see Eucalyptus), and in this form introduced into the sac or root canal. Dr. C. N. Peirce recommends iodoform ground up with equal parts of oil of cloves and oil of eucalyptus, which forms a substance of a soft cheesy consistence, a portion of which can be introduced to the inflamed part, on the point of a small broach. Iodoform is also a very serviceable application in alveolar pyorrhœa. A saturated solution in eucalyptus oil is also serviceable as an external application in neuralgia. Iodoform is also employed as an anodyne, for the relief of the pain following the ex-

traction of teeth affected with periodontitis, and alveolar abscess; also as an injection in diseases of the antrum, and as a packing for the pus pockets in alveolar pyorrhœa, for which purpose it is often combined with oil of eucalyptus, or oil of cinnamon. Also for filling the canals of pulpless teeth, for which purpose a paste of iodoform and carbolic acid is used, and allowed to remain for a few days, and, if no soreness follows, a permanent root-filling can then be introduced. When iodoform is used alone, a pellet of cotton or a strand of floss-silk may be dipped into glycerine, and the iodoform may be thus taken up. Dr. Francis Peabody recommended the application of the vapor of crystals of non-agglutinized iodoform for treating pulpless and diseased teeth, blind abscesses, etc. The cylinder of a hot-air syringe is partly filled with the crystals, and heated over an alcohol flame or gas jet until the crystals are fused. The syringe point is then placed in the root and the bulb compressed, forcing the vapor of iodoform into the canal, every part of which it permeates, the tubuli being filled throughout, and a precipitate deposited, forming a solid, insoluble filling. The vapor penetrates the apical foramen and comes in contact with the peridental membrane subduing irritation and inflammation, gradually restoring the tooth, and if loose, rendering it firm in its alveolus. To disguise the unpleasant odor of iodoform, it may be incorporated with a little oil of rose, as one drop of the oil will remove the odor of half a drachm of iodoform; the odor is also disguised by balsam of Peru, oil of cinnamon, oil of lavender, or oil of sassafras. Three grains of cumurin (a derivative of the Tonka bean) will disguise the odor of one drachm of iodoform; or the addition of attar of rose, one minim to the drachm; or of essence of rose geranium, three or four minims to the drachm. Creolin is also a very good deodorizer of iodoform; also aqua heliotrope, for the hands also, one or two drops of creasote or carbolic acid to the ounce of iodoform, is also recommended. The odorless substitutes of iodoform are *Antiseptol*, containing 50 per cent. of iodine; *Aristol*, containing 46 per cent. of iodine; *Iodol*, containing 89 per cent. of iodine: *Losophone*, containing 78 per cent. of iodine, and *Loizoidol*, containing 53 per cent. of iodine, 20 per cent. of carbolic acid and 7 per cent. of sulphur. According to some, it is not a matter of indifference whether iodoform be applied as a dressing for wounds

and ulcers, in the form of crystals, as amorphous powder dissolved in ether or as an ointment. Iodoform acts not only as a chemical combination, allowing the escape of iodine in a free state, but it has certain mechanical properties. When the surface of an ulcer or wound is covered with a layer of iodoform in crystals, a certain degree of absorption of the fluids secreted takes place. These products of secretion penetrating the interstices between the minute crystals of iodoform soon lose the lqiuid form, and produce with them an impermeable crust. Under this crust cicatrization soon occurs, without any retraction of the tissues; hence they suppose that the best form in which to employ iodoform for ulcers and wounds is that of the crystals. As toxic effects have followed the internal administration of iodoform, it should be prescribed with care, and also the application of it to extensive surfaces should be avoided. The toxic symptoms have been manifested as follows, the maximum dose which caused them in a certain case being 12 1/2 grains:

"Giddiness, vomiting and deep sleep, from which the patient could be roused with difficulty. The somnolence was interrupted by periods of excitement, each lasting several hours, and was followed by delirium, intense headache, sense of impending death, spasmodic contractions of the facial muscles, and in the case of the younger patient, diplopia. The functions of the other sensory organs were not disturbed, and the pupils presented a normal reaction. Deep inspirations alternated with apnœa of about a minute's duration. After five or six days, the toxic symptoms gradually lessened and passed away."

Iodoform has been used for odontalgia, on account of its gently caustic and anodyne reaction on exposed pulps of teeth. Combined with arsenious acid and creasote in a devitalizing mixture, iodoform lessens the pain caused by the arsenical paste. Dr. James Truman was the first to suggest the use of iodoform in combination with arsenious oxide.

M. Rummo, of the Academy of Science, regards iodoform as exerting an anæsthetic action when applied to wounds, but without the power to destroy germs in putrescent matter, although it prevents their development. M. Sauvat says that iodoform, when applied to wounds, reduces effusion and favors cicatrication, and exerts an anæsthetic action; but if carelessly used it may cause

erythema or even erysipelas. Iodoform in powder is now a popular dressing for waunds. Iodoform is more easily dissolved in alcohol and ether if there is camphor already dissolved in them; as an example: alcohol will dissolve only 1 1/4 per cent. of iodo form, while a saturated solution of camphor will dissolve 10 per cent. The spirits of turpentine will remove the odor of iodoform from the hands.

IODOFORMOGEN is an odorless preparation of iodoform (trio-iodo-methane $C.H.I_3$), prepared by passing the vapor of iodoform over red hot coal in a porcelain tube. Iodoformogen is in the form of a very fine, voluminous powder, nearly odorless. It can be sterilized at 212° F. without decomposition; is insoluble in water; and its potency depends upon its being readily decomposed by albuminous principles; its action is more prolonged than that of iodoform.

Dental Uses.—It is a valuable antiseptic for suppurative conditions, and is employed with advantage in empyema of the antrum, etc., etc. It is incompatible with tannic acid.

DENTAL FORMULÆ.

New Methods for Deodorizing Iodoform.

1.—Carbolic acid . . . 1 part
Iodoform . . . . 2 parts
Powder and mix well.

No change appears to take place in the iodoform, but the odor is masked by that of carbolic acid.

2.—Iodoform . . . 100 parts
Oil of peppermint . 5 parts
Oil of neroli . . . . 1 part
Oil of lemon . . . . 2 parts
Tinct. benzoin . . . 2 parts
Acetic acid . . . . 1 part.

Powder the iodoform, and mix thoroughly with the other ingredients. Transfer to a well-stopped flask, and keep at a temperature of from 120° F. to 140° F., over a water bath, for 2 days. The mixture has a pleasant odor of Eau de cologne.

3.—Camphor . . . . 5 parts
Charcoal . . . . 10 parts
Iodoform . . . . 15 parts
Powder and mix intimately.

For Pulpless Teeth.

℞ Iodoformi . . . . gr.x
Acidi tannici. . . . gr.iij
Glycerini . . . . . gtt.xv. M.
SIGNA.—Apply on floss-silk, or by syringe

PREPARATION.—Rub iodoform to fine powder, in a mortar, and add the tannin, and after mixing thoroughly, add the glycerine. One drop of oil of cinnamon will disguise the odor.

For Devitalizing Pulps of Teeth.

℞ Iodoformi . . . . . gr.v
Acidi arsenios . . . gr.x
Creasoti . . . . . q.s. M.
To make a paste.
SIGNA.—Apply on cotton, or on point of a broach.

For Putrid Pulps.

A. P. JOHNSON.

℞ Iodoformi gr.1/25
Camphoræ . . . . . ℥1/4
Alcoholis . . . . . ℥j

Mix by dissolving the camphor in the alcohol, and then add the iodoform.

SIGNA.—Use as an injection.

As a capping for an exposed pulp, it is suggested to dissolve the fillings of celluloid in the above mixture and form a thick paste.

For Odontalgia.

SCHAFF.

℞ Pulv. iodoformi . . . gr.lx
Kaolin . . . . . gr.lx
Acidi carbolici . . . gr.viij
Glycerini . . . . . q.s.
Olei menthæ piperit gtt.x

Triturate the iodoform, kaolin, and oil of peppermint, with enough glycerine to form a thick paste.

SIGNA.—Apply to exposed surface of pulp.

For Pulpless Teeth with a Fistulous Opening.

DR. FAUGHT.

℞ Iodoformi . . . . ℈j
Acidi tannici . . . . ℥ij
Glycerini . . . . . f℥ij
Morphinæ acetat. . . ℥j. M.

SIGNA.—Apply on floss-silk.

For Neuralgia and Tumors of the Gums.

℞ Iodoformi . . . . . gr.xv
Bals. Peru . . . . . gr.xxx
Glycerini vel vaselin q.s. M.
To make a solution or ointment.

SIGNA.—To be applied as a solution or, if the vaseline is used, as an ointment.

For Pulpitis, as a Capping.

PASCHKIS.

℞ Iodoform pulv.
Kaolin pulv. . . . āā gr.lx
Acidi carbolici (cryst.) gr. viij.

Mix, and add sufficient glycerine to form a paste, then add:

Ol. menth. pip. . . . gtt.x.

SIGNA.—Apply on point of broach over inflamed portion.

For Tumors, Enlarged Glands, etc.

℞ Iodoformi . . . . . part j
Collodii . . . . . part x. M.

SIGNA.—To be applied as a lotion.

For Pulpless Teeth—Canal-Dressing.

DR. PEIRCE.

℞ Iodoformi,
Olei caryophilli.
Olei eucalypti . . āā ℥vj. M.

SIGNA.—Apply by injection or on floss-silk.

For an Ointment of Iodoform and Eucalyptus.

℞ Pulv. Iodoformi . . ℥ss
Olei eucalypti . . . f℥ss
Vaselin . . . . . ℥iv. M.

SIGNA.—To be used as an ointment.

TETRA-IODO-ETHYLENE-DI-ODOFORM is a substitute for iodoform, which it resembles in chemical composition, and contains the largest percentage of iodine next to iodoform. Its formula is C_2I_4, and it is regarded as a condensation product of two mole-

cules of iodoform, $2CHI_3 - 2HI = C_2I_4$. It is prepared from acetylene di-iodide, C_2I_2, by dissolving in carbon-bisulphide, adding the equivalent of iodine and evaporating. This residue is insoluble in water, but can be recrystallized out of bisulphide, chloroform, benzene, or toluene in the form of yellow prisms melted at 192° C. It is unattacked by boiling nitric acid, but decomposed by alcoholic potash. It is free from the odor of iodoform.

IODOL—IODOLUM.

Formula.—$C_4I_4NH_4$.

Derivation.—Iodol is obtained by the action of iodine on certain constituents of animal oil; it contains 89 per cent. of iodine. It is in the form of a grayish white powder, which becomes dark on exposure to light.

It is odorless and has little taste, and contains 90 per cent. of iodine. It is quite soluble in alcohol, ether, chloroform, carbolic acid, olive oil and alkaline solutions, but insoluble in water; combination with an equal part of glycerine does not affect its properties.

Medical Properties and Therapeutic Uses.—Iodol is antiseptic, deodorant and anæsthetic. It is an efficient germicide without poisonous effects, and is free from the disagreeable odor and taste of iodoform. Its physiological action and therapeutic uses are the same as those of iodoform. When applied to an abraded or wounded surface, it can soon be detected in the urine and saliva; also the same effects are apparent when it is adiminstered by the stomach.

Its action is slower than that of iodide of potassium, but more prolonged, and its elimination is slower. It has a slight caustic action, but a larger quantity can be used when it is substituted for iodoform; no quantity applied to a wound will cause toxic symptoms.

It is used on wounds, ulcers, etc., in the form of an impalpable powder, which is dusted on the part. It is also employed in the form of an ethereal solution, and also in solution with alcohol and glycerine; also in the forms of iodol cotton and gauze, pastils, bougies and ointments. It improves morbid conditions, and can be advantageously substituted for iodoform. It has been ad-

ministered with good results in the treatment of laryngeal tuberculosis by insufflation of the powder; and the loss of appetite, so common as a result of the use of iodoform, does not occur, ulcers become rapidly clean and the tendency to form scars is scarcely observed.

Iodol is also employed internally, in the form of pills of 3 grains in the treatment of substernal struma. In the treatment of syphilitic ulcers, round ulcers, suppurating buboes, and after opening the pustules of acne, it has also given favorable results, as it lessens the secretion, possesses great disinfectant power and is non-irritating.

Dose.—For internal administrations, gr. 1/4 to gr. v, in wafer, pill, or pellet, or in powder.

Dental Uses.—Same as those of Iodoform (which see).

DENTAL FORMULÆ.

For a Topical Application.

MAZZONI.

℞ Iodol . . . . . 1 part
Alcoholis . . . . . 16 parts
Glycerini . . . . . 34 parts

SIGNA.—Apply with a camel's-hair brush or in the form of a spray.

Dental Varnish.

℞ Saturated solution of iodol in alcohol . . . . . 1 part
Hubbard's negative varnish 6 parts. M.

A good, quick drying varnish.

For Root-Canals of Abscessed Teeth.

VAN WORT.

℞ Iodol . . . . . gr.x
Zinci oxidi . . . . gr.xx
Vaseline carbol. q. s. to form a thick paste. M.

SIGNA.—Place in canal and seal with an oxyphosphate filling.

For a Topical Application.

Evaporating quickly.

℞ Iodol . . . . . 1 part
Æther. sulph. . . . 8 parts. M.

For Abrasions of Lips and Nostrils.

INGALLS.

℞ Iodol . . . . . gr.xxv
Acidi carbolici . . . ♏vj
Lanolin . . . . . ℥ss
Ol. rosæ . . . . . ♏v. M.

IODUM—IODINE.

Symbol.—I.

Derivation.—Iodine is a non-metallic, metalloid element, obtained principally from kelp (made by burning seaweed, and in the form of impure soda), which is subjected to distillation in iron retorts, after which it is mixed with sulphuric acid and

black oxide of manganese. It is evolved in the form of vapor, which is condensed. The vapor is readily recognized by its beautiful violet color. Iodine is usually in the form of bluish-black crystalline scales, with a metallic lustre, a strong, peculiar odor and a hot, acrid taste. It is slightly soluble in water, and soluble in alcohol, ether, solution of chloride of sodium and a solution of iodide of potassium.

Medical Properties and Action.—Iodine in small doses is alterative, stimulant and tonic, and acts locally as an irritant, causing redness, itching and desquamation; exhaled in the form of vapor, it excites cough and warmth in the air passages. Iodine vaporized with steam in a strength of 10 minims, is sometimes inhaled in pulmonary diseases. Taken internally it excites a sensation of heat or burning in the stomach, and in large doses is an irritant poison, inflaming the mucous membrane of the stomach and causing superficial eschars The internal use of the iodides gives rise to an eruption of acne, especially on the face, thighs and shoulders; they have also anaphrodisiac powers when long continued. The influence of the iodides in producing iodism may be prevented by large drafts of water being used during their administration.

The odor of iodine can be detected in the blood, brain and muscles.

When combined with potassium its local irritant effect is diminished; hence the preparation known as IODIDE OF POTASSIUM, *Potassii Iodidum* (obtained by treating an aqueous solution of potassa with iodine), is employed whenever the constitutional effects of iodine are desired, as the iodide of potassium possesses many advantages over iodine for internal use, such as being less irritant, and for this reason may be administered in larger doses and for a greater length of time; it is also more soluble than iodine alone, and when taken into the stomach is absorbed much more rapidly. The formula is Ki, and it is in the form of white crystals, of an acrid, saline taste. Some persons are peculiarly susceptible to the influence of iodine, even small doses causing unpleasant effects, such as headache, vertigo, derangement of the digestive organs, etc.

Iodide of potassium, like iodine, produces a very decided effect on the secretions, increasing them, and occasionally to the

degree of ptyalism. The antidote for poisoning by iodine is starch.

Therapeutic Uses.—Iodine and its preparations are valuable resolvents in the treatment of glandular enlargements, indurations, tumors, thickening of membranes, etc., etc.; also in scrofula, scrofulous ophthalmia, tubercular meningitis, advanced stage of pleurisy, chronic affections of the liver, etc., etc.

Iodide of potassium is much employed in mercurial poisoning and in syphilis, especially in the secondary and tertiary forms, and after the employment of mercury has proved useful; also in affections of the nervous system of a syphilitic origin, together with the other affections already referred to as indicating iodine. Externally iodine is used in the form of tincture in the treatment of enlarged scrofulous glands, cutaneous affections, esysipelas, rheumatism, gout, phlegmons, syphilitic gummatæ and nodes, phagedænic ulcerations, carbuncles, diseases of the joints, wounds and parts poisoned; and as a counter-irritant in pneumonia, phthisis and pleurisy; and as injections in hydrocele and bronchocele. The vapor is inhaled with benefit in chronic bronchitis and phthisis. Iodine also ranks highly as a disinfectant.

Dose.—Of iodine alone, gr. 1/4 to gr. j two or three times a day, in the form of a pill, directly after eating on account of its irritant effect; the best form of administration, however, is iodide of potassium. Dose of the iodide of potassium, gr. iij to gr. x. A new way of giving iodine internally is by dissolving iodine in water with four times its weight of iodide of potassium, and mixing with glucose.

Tincture of Iodine—Tinctura Iodi (iodine, ℥j; alcohol, Oj). Dose, ♏j to ♏v.

Compound Tincture of Iodine—Tinctura Iodi Composita (iodine, ℥ss; iodide of potassium, ℥j; alcohol, Oj). Dose, ♏ij to ♏x.

A new tincture of iodine has been introduced by Prof. Elsberg, which may be substituted for the officinal tincture, and which can be combined with tincture of aconite root.

It is claimed that it is much stronger than the officinal 7 per cent., as it contains 20 per cent. of iodine; and that no poisonous effects have resulted from its use; one application being as beneficial as four of the officinal tincture. The formula is iodine 20.0; alcohol, ether, āā 40.00.

Colorless Iodine.—Iodine is bleached by carbolic acid, and the colorless carbolate combines all the advantages of both base and acid. One of the easiest methods to decolorize iodine is to add forty minims of a saturated solution of hyposulphite of soda to each fluid ounce of the tincture of iodine. Forty minims of the saturated solution contain about thirty-two grains of sodic hyposulphite. Another method of decolorizing iodine it to put into an open vessel a drachm of the tincture of iodine and six ounces of *hot* water; add twelve grains of phenol, and stir with a glass rod, when the solution will be at once bleached.

Dental Uses.—In dental practice iodine and its preparations are valuable agents, the official and compound tinctures being employed in the treatment of periodontitis, alveolar abscess, mercurial stomatitis and other forms of stomatitis, inflammation and ulceration of the gums, fungous growths of gum and tooth pulps, necrosed teeth and suppurating pulps of teeth, diseases of the antrum, caries of maxillary bones, dentigerous cysts, recession of gums and absorption of alveolar processes. The combination of equal parts of tincture of iodine, tincture of aconite, tincture of cannabis indica and compound tincture of benzoin to be locally applied, is a more effectual remedy than the former aconite and iodine mixture, for periodontitis, pulpitis, inflammation about erupting third molars, and incipient alveolar pyorrhœa. It is a counter-irritant and will often abort a forming abscess.

For the different forms of stomatitis, and especial mercurial stomatitis, the tincture of iodine is used in the form of a gargle; for an injection in alveolar abscess it is diluted or combined with carbolic acid, glycerine and other agents; for fungous growths it may be used alone, or combined with rectified alcohol; for ulcerations of gum and mucous membrane it is generally combined with carbolic acid; for periodontitis it is combined with the tincture of aconite root, and is regarded as being almost a specific for the incipient stages of this affection, as it relieves the inflammation by retarding the circulation and stimulating lymphatic action. Either the officinal or compound tincture is employed with an equal quantity of the tincture of aconite, the preparation being applied to the gum over root of affected tooth, which should be previously dried of moisture, by means of a camel's-hair brush or cotton on the point of an excavator. The mouth should

be kept open and the part protected until a metallic pellicle is formed. Iodine is also a valuable disinfectant and germicide in the treatment of alveolar abscess (in the form of the compound tincture), used as injection throughout the pus tract, and for root canals and the pus-pockets of alveolar pyorrhœa.

A valuable combination of iodine, carbolic acid, glycerine and water is known as "Boulton's Preparation," and is a useful application in the form of injections, gargles and lotions. For the chronic form of alveolar abscess, and also for the acute form, after more powerful agents have been employed, it is a useful remedy, possessing antiseptic and stimulant properties in a marked degree; it also possesses the property of modifying mucous membrane and diminishing sensibilty; hence it is useful in ulcerations, etc. Tincture of iodine combined with creasote or carbolic acid is a powerful application in periodonitis, suppuration of necrosed teeth, ulceration of margins of the gums and for fungous growth, as it stimulates debilitated parts and destroys such as are too weak to be restored. A colorless tincture of iodine is composed of glycerine and aqua ammonia in combination with the iodine, but the presence of the ammonia restricts its use. Another colorless tincture, in which sulphate of soda is substituted for the ammonia, is less irritating in its effects.

The addition of water and honey to the officinal tincture of iodine will render it suitable for a gargle for inflamed and ulcerated parts. The iodide of potassium is employed internally in mercurial stomatitis, dental exostosis, facial neuralgia, convulsions of dentition, periodontitis, looseness of the teeth, tumefaction and sponginess of the gums, syphilitic and scrofulous ulcerations of the mouth, caries and necrosis of the maxillary bones.

Tincture of iodine mixed with glycerine is claimed by Dr. Hammond to be more effective as a local application than the plain tincture. This is due to the retardation of the dissipation of the iodine, or more probably to the skin remaining soft and therefore in a better condition for absorbing the drug.

Iodine Trichloride is formed by passing chlorine gas over iodine. It is obtained in the form of reddish crystals, is soluble in its own weight of water, and almost as readily in alcohol, and either solution can be mixed with glycerol without decomposition. Dr. Belfield regards it as a powerful local antiseptic for irrigating

suppurating wounds, and tuberculous processes. He uses solutions of 5 to 20 per cent. in equal parts of water, alcohol and glycerol.

DENTAL FORMULÆ.

For Periodontitis, Pulpitis, Inflammation from Erupting Teeth, Aborting Abscesses, Incipient Alveolar Pyorrhœa.

℞ Tinct. Iodi
Tinct. aconiti
Tinct. can indica.
Tinct. benzoin comp. āā parts.

SIGNA.—Apply locally drying surfaces and keeping them dry for a minute after, to facilitate absorption.

For Chronic Alveolar Abcess, Ulcerations, Inflammations, etc., etc.

BOULTON.

℞ Tinct. iodi. comp. . ♏xlv
Acidi carbolici (cryst.), ♏vj
Glycerini . . . . . ℥j
Aquæ destillatæ . . . ℥v. M.

It becomes colorless in from 8 to 10 hours.

SIGNA.—To be used as injection, gargle or lotion.

For Ulceration of Gums.

℞ Tinct. iodi. . . . . ♏xlv
Acidi carbolici . . . ♏vj
Glycerini . . . . . ℥j
Aquæ destillatæ . . . ℥v. M.

SIGNA.—Apply as a lotion.

For Periodontitis.

℞ Tinct. iodi. . . . . ℥j
Creasoti vel.,
Acidi carbolici . . . ℥ss. M.

SIGNA.—To be applied to gum about neck of tooth, as a counter-irritant.

For Ulcerated Gums and Mucous Membrane.

℞ Tinct. iodi. . . . partem j
Mellis . . . . . partes ij
Aquæ . . . . . partes vij. M.

SIGNA.—To be used as a gargle.

For Periodontitis.

℞ Tinct. iodi. . . . . ℥x
Potassii iodidi . . . ℥ss
Camphoræ . . . . . ℥ij
Spiriti rectificati . . f℥x. M.

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

For Fungus Growths and Suppurating Surfaces.

℞ Tinct. iodi. . . . . ℥ij
Spiriti rectificati . . ℥j. M.

SIGNA.—To be applied with a camel's-hair brush.

For Mercurial Stomatitis.

℞ Tinct. iodi. . . . ℥iij vel vj
Potassii iodidi . gr. xv vel xxx
Aquæ . . . . . Oss. M.

SIGNA.—To be used as a gargle.

For Periodontitis.

℞ Tinct. iodi.,
Tinct. aconiti . . . . āā ℥ss. M.

SIGNA.—To be applied by means of camel's-hair brush until a metallic pellicle is formed, three times daily.

For Excessive Sweating of the Hands.

℞ Tinct. iodi. . . . . ℥j
Lin. camphoræ comp.,
Glycerini . . . . . āā ℥iss
Lin. belladonna comp. ℥j
Eau de cologne . . ℥j. M.

SIGNA.—Apply as an embrocation twice a day, having previously well bathed the hands in warm water, in which is dissolved 2 drachms or half an ounce of chloride of ammonia and 4 drachms of carbonate of soda crystals, enough water being used to well cover the hands.

For Putrescent Pulps and Chronic Alveolar Abscess.

℞ Iodi. . . . . ʒij
Alcoholis . . . . . fʒij. M.

For Same and Pyorrhœa Alveolaris.

℞ Iodi.,
Acidi carbolici (crystals) . . . . . āā ʒj
Alcoholis . . . . . fʒij. M.

For Acute Alveolar Abscess.

DR. J. P. BUCKLEY.

℞ Potassii iodidi . . . ʒjss
Syrupi sarsaparilla comp. . . . . fʒiij. M.
SIGNA.—Take a teaspoonful in water after meals.

IRIDIS RHIZOME—ORRIS RHIZOME—ORRIS ROOT.

Source.—The plant from which Orris Root is obtained is a native of Italy and the south of Europe. It belongs to the natural order Iridaceæ, of which there are three varieties of the species of Iris—*Iris Rhizoma, Iris Florentina and Iris Germanica.* The root which is the officinal portion of the plant, is of various forms and sizes, often branched, usually knotty and flattened, white, heavy, and of the thickness of the finger. It has a pleasant odor, like that of violet, and a bitter, acrid taste.

Medical Properties and Action.—Orris root is cathartic and diuretic, and in large doses emetic. It has been employed with some benefit in dropsies, but is not often administered as an internal remedy at the present time. It is valued for its pleasant violet odor, and tonic influence upon the mucous membrane.

Dental Uses.—In dental practice it is employed as a very common ingredient of dentifrices, and also to correct an offensive breath.

DENTAL FORMULÆ

Dentifrice.

DR. SEWELL.

℞ Pulv. radicis iridis . . . . . ʒss
Pulv. saponis cas. . . . . ʒij
Pulv. sodii boratis . . . . . ʒij
Cretæ preparatæ . . . . . ʒij. M.
Flavor with a few drops of oil of cloves and lavender.

Or, add a few drops of carbolic acid to each ounce of the powder and flavor the whole with eucalptus oil.

(For other dentifrices see Prepared Chalk.)

ISONANDRA GUTTA—GUTTA PERCHA.

Source.—Gutta Percha is the inspissated juice of the tree *Isonandra Gutta*, extensive forests of which are found in the East Indies. It belongs to the natural order *Sapotaceæ*. It is in the form of tough, flexible pieces, which have been freed from impurities by cutting it into thin slices, and then washing and tearing it into shreds by heavy machinery while it is softened in boiling water. It may be more thoroughly purified by dissolving it in either chloroform, benzol or hot turpentine, thus causing the impurities to separate, when it is evaporated to dryness. Crude gutta percha is of a chocolate or reddish-brown color; commercial gutta percha is of a grayish-white color, and the variety which has been purified by dissolving it in chloroform, etc., is almost white, greasy to the touch, and of a leathery smell, like that of India rubber It is insoluble in water at any temperature, and is a bad conductor of heat and electricity. At ordinary temperatures it is tough, hard and inelastic, but toward 120° F. it softens, and at 150° it becomes soft and plastic, and may be moulded into any form, which it will retain on cooling, having, however, a perceptible shrinkage. Gutta percha is dissolved cold by chloroform and sulphide of carbon; benzol requires the aid of heat, and oil of turpentine requires to be quite hot. The alkalies have no action upon it; but concentrated nitric acid attacks it rapidly, with effervescence and the escape of nitrous fumes.

Dental Uses.—Combined with mineral substances it forms a plastic material for temporary fillings of teeth, and, colored with vermilion, is used for taking impressions of the mouth and for the base plates of plastic work. It is often employed as a filling material, on account of its non-conducting property, protecting partially exposed pulp or sensitive dentine surface from irritation when metallic fillings would not be tolerated. Gutta percha has also been used for interdental splints.

The preparation known as "Hill's Stopping" is composed of gutta percha, quicklime and feldspar, the mineral ingredients being incorporated with the gutta percha while the latter is in a plastic condition from the effects of heat.

Solution of Gutta Percha—*Liquor Gutta Percha, Chloropercha*—is composed of gutta percha, ℥iss; chloroform, ℥xvij; or

a thick solution may be made by dissolving as much gutta percha in chloroform as will give the desired consistence (generally like that of thick cream).

Solution of gutta percha is a useful application for the relief of odontalgia arising from an exposed and inflamed pulp; also for capping an exposed pulp, a more durable material being inserted over it. The chloroform of the solution quickly evaporates, leaving an impermeable covering of the gutta percha, which is non-irritable, non-conductive and protective. It is also a useful application for inflamed or abraded surfaces, chaps, skin affections, etc. Gutta percha dissolved in chloroform (*chloro-percha*) is also a popular and efficient material for root fillings, as are also cones of gutta percha softened by heat or dipped in chloroform. The chloropercha solution and cotton is a useful agent, the chloro-percha solution being of such a consistence, neither too thin nor too thick, that the cotton will absorb it. Being of an adhesive nature, it will readily adhere to walls of cavities and to tooth-surfaces, and is useful to retain medicines and exclude moisture, to wedge the teeth, to force back gum tissue, to assist in retaining clamps in position, etc. The red gutta percha of base plates is preferred by some in making the chloro-percha solution on account of its color rendering it easy to detect in the mouth, and also to determine how much of the solution the cotton has absorbed.

FORMA-PERCHA is a preparation of gutta percha impregnated with formaldehyde, in the form of a liquid which is flowed into root canals as an antiseptic for filling them, and into a dry cavity to obtund sensitive dentine. Its ingredients are 40 per cent. aqueous solution of formaldehyde gas, oil of eucalyptus, oil of cassia, and red base gutta percha.

KRAMERIA.

RHATANY.

Source.—Krameria is obtained from the root of the shrub krameria triandra, of the natural order *Polygaleæ*, native of Peru. It is in the form of cylindrical pieces, of the thickness of a quill, with many branches of a light red color within and crossed by a

reddish-brown bark. The root is without odor, and of an astringent and somewhat bitter-sweetish taste.

Medical Properties and Action.—Krameria is a powerful astringent, its medicinal property being due to tannic acid, of which it contains about forty per cent. There is also present an odorous principle, wax gum, and a peculiar acid known as *krameric acid.* When chewed it imparts a red tinge to the saliva. It imparts its properties very readily to alcohol, but less so to both cold and boiling water.

Therapeutic Uses.—Krameria is employed internally for its astringent and a slightly tonic effect in the treatment of diarrhœa, dysentery, passive hemorrhages, menorrhagia, leucorrhœa, etc. Externally, in the form of powder, tincture and infusion, in the treatment of ozæna, ophthalmia, etc., and as an enema in hemorrhoids, fissures of the anus, sore nipples, leucorrhœa, etc., etc.

Dose.—Of powdered krameria, gr. xx to gr. xxx; of the extract—*extractum krameriæ*—the dose is gr. v to gr. x; of the infusion—*infusum krameriæ*—(krameriæ ℥j; water, Oj), the dose is ℥ss to ℥j; of the tincture—*tinctura krameriæ*—(krameriæ, ℥vj; diluted alcohol, Oij), the dose is ℥j to ℥ij. Of the fluid extract—*extractum krameriæ fluidum*—the dose is ♏v to ℥ss; of the syrup—*syrupus krameriæ*—the dose is ℥j to ℥iv.

Dental Uses.—Krameria is a valuable astringent in dental practice, being employed in the form of the tincture, in ulcerated and spongy gums; in the form of the infusion, as a gargle in inflammation of the gums and mucous membrane; in the form of the powder and also tincture, in spongy and bleeding gums, as an astringent; and also in the form of the powder as an ingredient of dentifrices, for its astringent property.

DENTAL FORMULÆ.

Astringent and Stimulant Mouth-wash.

℞ Tinct. krameriæ,
Boro-glyceride,
Eau de cologne . . āā ℥j
Spts. vini. recti . ad. ℥viij. M.

SIGNA.—A teaspoonful to be added to a little water.

For Inflamed Gums and Mucous Membrane.

THOMAS.

℞ Pulv. krameriæ,
Pulv. cinnamomi . āā ℥j
Aquæ bullientis . . f℥vii.
Macerate for 2 hours, strain, and add sacchari ℥ij.

SIGNA.—To be used as a gargle.

For Gingivitis.

DR. SABATIR.

℞ Tinct. krameriæ . . ℥j
Tinct. opii . . . . . ℥ij
Tinct. myrrhæ . . . ℥j
Aquæ camph. . . . . ℥vj. M.
SIGNA.—Use as a mouth-wash.

Styptic for Bleeding Gums.

VIAU.

℞ Tincturæ krameriæ . f℥j
Chloroformi gr.60
Acidi tannici . . . . grs.xxx
Menthol . . . . . grs.xxx
Aquæ destillatæ . . f℥xvij.M

LANOLIN—ADEPS LANÆ.

Lanolin is the natural fat of wool and is used as a substitute for ordinary fat for local use. On account of its being analogous to the natural fat of the skin, it is supposed to be more freely absorbed by the tissues than the ordinary fats; hence it is employed as a vehicle for remedies which are to be absorbed, and for such a purpose has been combined with arsenious acid and hydrochlorate of cocaine in a devitalizing mixture. It mixes with 30 per cent. of its own weight of water without destroying its character as an ointment and thus allows the use of solutions of salts or alkaloids in an ointment.

DENTAL FORMULA.

For Soft, White Hands.

℞ Lanolin . . . . . 20 parts
Glycerine . . . . . 20 parts
Borate of soda . . . . . 10 parts
Oil of eucalyptus . . . . . 2 parts
Essence of bitter almonds . . . . . 25 drops. M.
SIGNA.—Rub hands with preparation, and cover with gloves at night.

LIQUOR SODÆ CHLORATÆ—SOLUTION OF CHLORINATED SODA.

LABARRAQUE'S SOLUTION.

Formula.—NaCl, NaClO.

Derivation.—Solution of Chlorinated Soda is obtained by decomposing a solution of carbonate of sodium by one of chlorinated lime. It is a transparent liquid, of a greenish-yellow color, having a faint odor of chlorine and a sharp saline taste, and contains about 2.6 per cent. of chlorine.

Medical Properties and Action.—Solution of chlorinated soda internally is stimulant, tonic and antiseptic. Externally it is a

stimulant, astringent and deodorizer, and is generally applied in the form of a lotion.

Therapeutic Uses.—Solution of chlorinated soda is employed internally in typhus and typhoid and malignant scarlet fevers, mesenteric affections of children, etc. Externally it is used as an application to all forms of foul and indolent ulcers, ulcerations of membrane, ozæna, coryza, otorrhœa, syphilitic eruptions of scalp and other skin diseases, burns, etc., etc. It is used diluted and has an alkaline reaction. It is a powerful disinfectant, and is useful in all affections attended with fetor. The concentrated solution is an irritant poison and caustic; largely diluted it is tonic and stimulant.

Dose.—A solution of chlorinated soda, gtt. xxx to ℥j, diluted, several times a day; it fulfills the same indications as chlorinated lime.

Dental Uses.—Solution of chlorinated soda is a valuable agent in dental practice as a disinfectant, deodorizer and antiseptic. It is employed in mercurial stomatitis, ulcerated gums, fetid discharges from carious teeth, and all affections of the mouth attended with fetid discharge, and is useful for its stimulating property, thus inducing healthy action; also in aphthæ, cancrum oris, diseases of the antrum, necrosis of the bones of the jaws, scurvy, offensive breath, and as a bleaching agent for discolored teeth, especially in combination with powderted alum, or dilute acid to free the chlorine (*Truman's Method*). It should be kept in glass-stoppered bottles and protected from the light and heat.

DENTAL FORMULÆ.

For Aphthæ and Ulceration of the Mouth of Children.

℞ Liquor sodæ chlor.,
Myrrhæ . . . . . āāf℥ss
Aquæ rosæ . . . . f℥j
Aquæ . . . . . f℥vj. M.
SIGNA.—To be used as a lotion.

For Mercurial Stomatitis.

℞ Liquor sodæ chlor. . ℥ss
Mellis . . . . . ℥ss
Aquæ destillatæ . . . ℥x. M.
SIGNA.—To be used as a mouth-wash.

For Phagedenic and Sloughing Ulcers.

℞ Liquor sodæ chlor. . f℥j
Aquæ . . . . . f℥viij. M.
SIGNA.—To be applied as a lotion.

For Mercurial Stomatitis, Fetid Discharges from Carious Teeth, Ulcerated Gums, Etc.

℞ Liquor sodæ chlor. . f℥vj
Aquæ . . . . . f℥xij. M.
SIGNA.—To be used as a lotion.

For Offensive Breath and Deodorizer Generally.

℞ Liquor sodæ chlor. (concent.) . . . . gtt. vj to x
Aquæ puræ . . . . . ℥ij. M.
SIGNA.—To be used as a gargle.

For Offensive Breath.

℞ Liquor sodæ chlor. . ℥j
Aquæ . . . . . ℥iv. M.
SIGNA.—To be used as a gargle.

KINO—KINO.

Source.—The inspissated juice of the *Pterocarpus Marsupium*, and of other plants, the tincture only being used.

Medical Properties and Therapeutic Uses.—With Krameria, Galla, and Catechu, Kino is one of the substances containing forms of tannic acid, and has the same physiological action and uses, being powerfully astringent. The tincture, "*Tincturæ, Kino*" composed of ten parts of kino to one hundred parts of alcohol, is the only preparation employed.

Dose.—Of *Tincturæ Kino*, ♏x to ℥ij. (See Tannic and Gallic Acids, Krameria.)

LITHIUM—LITHIUM.

Source.—From the alkali Lithium, which is rare in nature.

Preparations.—*Lithii Carbonas*—carbonate of lithium, a white powder but slihgtly soluble in water, and having a feeble alkaline reaction.

Dose.—Grs. ij to grs. x.

Lithii Citras.—Citrate of Lithium, a deliquescent white powder, soluble in twenty-five parts of water.

Dose.—Grs. v to grs. xxx.

Lithii Salicylas.—Salicylate of Lithium, a deliquescent white powder with a sweetish taste, feeble acid reaction and very soluble in alcohol and water.

Dose.—Gr. v to ℈j.

Lithii Benzoas.—Benzoate of Lithium, either in the form of a white powder or small shining scales, is not deliquescent in the air, and has a sweetish, cooling taste and a feeble acid reaction.

It is soluble in twelve parts of alcohol at 60° F., and in four parts of water.

Dose.—Gr. ij to gr. xv.

Medical Properties and Therapeutic Uses.—These lithium salts have strong alkaline properties, and produce effects similar to those of the potassium and sodium compounds; and hence are very effective antacid agents. The salts of lithium are employed with great benefit in rheumatic gout, uric acid diathesis, rheumatism, uric acid calculi of kidneys and bladder, irritable bladder from an excess of acid in the urine, etc.

Dental Uses.—The lithium salts are effective in preventing and correcting the effects of a gouty diathesis upon the teeth, and in periodontitis dependent upon gout. The carbonate of lithium is employed to arrest the abrasion or erosion of the teeth, when due to an excess of uric acid in the saliva; for such a purpose the agent can be dissolved in carbonic acid water.

LITMUS—LACMUS.

Source.—Litmus is a peculiar coloring matter obtained from various species of rocella, of the natural order *Lichenes*—the Lichen order, which grow on Alpine or maritime rocks in various parts of the world. The varieties used for chemical purposes are obtained from the European and African coasts and Northern Europe. They yield coloring substances by the reaction of water, air, and ammonia. Litmus is prepared chiefly in Holland; the lichens are coarsely powdered and macerated for several weeks, with occasional agitation in a mixture of urine, lime and potassa or soda, fermentation ensuing; the mass becomes first red and ultimately blue, and is then mixed with calcareous or siliceous matter, to give it consistence. A tincture is formed from this product (litmus 1 part to distilled water 20 parts), and blue litmus paper is made by steeping unsized paper in the liquid and afterward drying it. The blue tincture is rendered deeper in color by indigo. Red litmus paper is prepared in the same manner, except that the tincture, into which the unsized paper is steeped, is reddened by the addition of sulphuric acid.

Dose.—The chief use of litmus in medicine and dentistry is as a test of acids and alkalies; *blue* litmus paper being turned *red* by acids, while *red* litmus paper is turned blue by alkalies. In dental practice litmus paper is employed to determine the nature of the oral fluids—whether acid or alkaline.

A single color, viz., purple, has recently been substituted for the ordinary blue and red litmus paper. This purple litmus paper turns red with acids, blue with alkalies. It is claimed to be much more delicate and convenient.

LORETIN—META-IODO-ORTHO-OXYQUINOLINE AND SULPHONIC ACID.

Loretin is a new succedanum for iodoform, and is in the form of a beautiful yellow crystalline powder, which resembles iodoform in appearance, but is free from objectionable odor, and does not produce an artificial eczema, two drawbacks to the use of iodoform, as loretin is completely odorless.

In water and alcohol, loretin is only slightly soluble, in ether and oils practically insoluble, but with oily liquids and especially with collodion it forms emulsions which are excellently adapted for many purposes.

Therapeutic Uses.—Loretin is non-poisonous, and is equally well adapted, especially when mixed with a small proportion of calcined magnesia, as a dusting powder for the surface of wounds and for insufflating into hollows and cavities. Bacteriological experiments by Ammelburg have demonstrated the power of loretin as a germicide as well as an antiseptic.

In the treatment of wounds, the surface is kept clean with dry sterilized pads of gauze, and then closed with the needle. A bandage with lumps of surgical wadding and loretin collodion is then laid upon the closed wound. Cavities are dusted with loretin powder, or a tampon of loretin gauze is introduced; a small pencil of loretin is laid in punctured wounds.

The healing of the wound is usually unaccompanied by any fever and progress without festering. There is an absence of any irritating effect on the skin, and persistent eczema has been cured by this agent; it is also employed in empyema of the pleural cavity and purulent cystitis.

Dental Uses.—In dental practice loretin may be employed in all cases requiring the application of antiseptics and germicides, as a substitute for iodoform (for the dental uses of which see page 433) and without the disadvantages of the latter agent.

LYSOL.

Derivation.—Lysol is obtained by boiling coal tar with fat, alkali, resinous acid and resin, and contains no phenol, but principally cresol. It is readily soluble in water, and has a strong pungent odor. It is of the consistency of soft or potash soap, or in the form of a clear oily liquid.

Lysol is a very complex substance (not homogeneous), without any definite formula.

Medical Properties and Therapeutic Uses.—It is claimed that lysol is superior as a germicide to carbolic acid, iodoform and creolin, its bactericide properties being very great. As an antiseptic, etc., in the treatment of wounds a 1 per cent. solution is employed; for internal washings 1/2 per cent. solutions are recommended. It sometimes exerts an irritant action on the skin.

Dr. F. Haenel lays special stress upon the simplicity of its use —a few minutes' energetic brushing with the solution being all that is required to prepare a surface for operation, instead of the usually complicated process of cleaning and disinfecting the skin. For this purpose lysol answers as well as the best soap, removing not only visible dirt, but fatty or resinous spots on the skin, instruments, etc. The soapy feeling it imparts to the hands instruments and sutures, is best avoided by drying the hands and the prepared area of operation with a sterilized cloth before beginning to operate.

With respect to the bactericidal properties of the preparation, Schotellius found that in 15 to 20 minutes a one-third per cent. solution destroyed all kinds of germs. The investigations of Gerlach led to similar results, and the experiences of Dr. F. Haenel are also in accordance with these statements. He used solutions varying in strength from 1/2 to 1/3 per cent., and on all grounds concludes that Lysol is superior to sublimate, carbolic acid, iodoform, and the other ordinary antiseptics, either by virtue of its non-poisonousness, or odorlessness, or the clearness of its solutions. It forms, he points out, clear mixtures with distilled water, or with ordinary water which does not contain much chalk. In solutions made with spring or tap water which contain much lime, a turbidity appears which increases in the progress of time, and is less conspicuous in strong than in weak solutions.

As the disinfectant constituents remain in solution, the bactericidal action of the liquid is no way prejudiced. For some purposes this turbidity is a disadvantage, however, and the author states that the best way to avoid it, is to prepare the solutions immediately before use, if necessary, to avoid the employment of the weaker dilutions.

Dental Uses.—Lysol may be employed in dental practice as an antiseptic, disinfectant, and germicide in the case of putrescent or gangrenous pulps, to disinfect root-canals and carious cavities of teeth; also in the form of a 1 per cent. solution for unhealthy wounds and ulcers of the oral mucous membrane, upon which it has an astringent effect. It is advisable to employ lysol in from 1/2 to 1 per cent. solution whenever an antiseptic or aseptic injection is desired, and in 1 to 2 per cent. solution for dressing wounds and sterilizing instruments and also the hands.

DENTAL FORMULÆ.

Mouth-wash.

℞ Lysol . . . . . ℥ss
Aquæ . . . . . ℥xvj. M.

For Alveolar Pyorrhœa.

Dr. F. T. Van Woert.

℞ Lysol . . . . . f℥ij
Tint. capsicum . . . . . gtt, xv
Tinct. Iodine . . . . . f℥j. M.

Signa.—Five drops in one-half glass of water used as a wash in cleansing teeth with a brush.

MAGNESIA—CALCINED MAGNESIA.

Formula.—MgO.

Derivation.—Magnesia is obtained by exposing carbonate of magnesium to a red heat, and thus expelling all of the carbonic acid, which is shown by a want of effervescence on the addition of dilute sulphuric acid. It is very light, and of a white color and odorless, and in the form of powder, with an earthy taste,

and slightly soluble in water, more so in cold than in hot water; and insoluble in alcohol.

Medical Properties and Action.—Magnesia is antacid and laxative, its laxative effect being the result of the combination it forms with the free acids of the stomach and intestines. After its effects are exerted in the intestinal canal, it becomes absorbed and renders the urine alkaline. Large doses, when administered for a considerable time, may accumulate in the bowels; such an effect may be avoided by administering it with lemonade, which renders it more soluble. Being mild and unirritating, it is well adapted for children, and is an excellent remedy for great acidity in the stomach. It is the antidote for poisoning by the mineral acids.

Therapeutic Uses.—Magnesia is administered in acidity of the stomach, heartburn, sick headache and kidney affections, as an antacid, and in combination with other agents in the diarrhœa of children. It is also an efficient aperient, alone or in a little milk.

Dose.—Of magnesia, as a laxative, gr. x to ℥j; as an antacid, ℈j. Of a preparation known as "Henry's" the dose is half the quantity just given.

Dental Uses.—Magnesia is employed in dental practice, chiefly for its antacid properties, as an ingredient of dentifrices; in solution in the form of a gargle, to counteract the effect of acid medicines upon the teeth; also as an ingredient of remedies for infantile diarrhœa during the period of dentition; and also to change an acid condition of the oral fluids, by being rubbed between the teeth and permitted to remain for a short time.

Magnesium Hydrate.—Dr. E. C. Kirk recommends Phillips' Milk of Magnesia, which consists of precipitated magnesium hydrate held in suspension in water, for contracting the injurious action of acid secretions, especially in erosion cases. It is applied in the same way that lime-water or precipitated chalk is used for the purpose of bringing about an alkaline condition of the oral fluids, by neutralizing the excess of acids present. A teaspoonful of the preparation taken into the mouth and allowed to float around over the teeth coats them with a slight film of magnesium hydrate, which protects the tooth-surface from the acid action for a number of hours. It should be used three times daily, after meals, and for erosion, night and morning.

DENTAL FORMULÆ.

For Infantile Bilious Diarrhœa.

CONDIE.

℞ Magnesiæ calc . . gr.xxiv
Calomel . . . . . gr.ij–iij
Ipecacuanha . . . gr.ij–iij
Ext. hyoscyami . gr.iv–vj. M.
F. ch. No. xij.

SIGNA.—One to be given every 2 or 3 hours.

For Infantile Mucous Diarrhœa.

EHERLE.

℞ Magnesiæ calc . . . gr.x
Bals. copaibæ . . . ℥j
Spir. æther nit. . . . ℥iij
Sacch. alb. . . . . ℥ij
Aq. cinnamon . . . ℥iij. M.

SIGNA.—A teaspoonful every 2 or 3 hours; each dose to be followed in the course of an hour by the fifth of a grain of Dover's powder.

MAGNESII SULPHAS—SULPHATE OF MAGNESIUM.

(EPSOM SALT.)

Formula.—$MgSO_47H_2O$.

Derivation.—Epsom Salt is obtained by the action of sulphuric acid on *magnesite*, the siliceous hydrate of magnesium. It is in the form of small, colorless crystals, which effloresce on exposure to the air, and are very soluble in water. It is odorless, but has a very bitter taste.

Medical Properties and Action.—Sulphate of magnesia is a refrigerant purgative, safe and mild in its action, and is perhaps more commonly employed as a cathartic than any other. It is at times combined with other agents.

Therapeutic Uses.—Sulphate of magnesia is administered as a saline purgative in acute inflammatory and febrile affections, to depress the arterial tension, and also to relieve the kidneys when they are hyperæmic; hence it is a valuable remedy in renal and cardiac dropsy, constipation of lead colic, acute dysentery, dyspepsia with constipation, etc., etc.

Dose.—Of sulphate of magnesia, ℥j to ℥j, in water or carbonic acid water.

Dental Uses.—Sulphate of magnesia is employed internally in dental practice, to reduce the arterial tension in acute inflammations of the dental organs, such as acute pulpitis, acute periodontitis, etc.

To disguise the bitter tase of Epsom salts, the following formula may be employed:

℞ Magnesii sulphatis . . . . . ℥v
Essentiæ menthæ . . . . . gtt.iij. M.

DENTAL FORMULA.

For Dysuria of Difficult Dentition.

℞ Sulph. magnes . . . . . ℥ij to ℥iij
Aquæ yuræ . . . . . ℥j *dein adde*
Spir. æther. nitrici . . . . . ℥ij
Tinct. opii . . . . . ♏vij to xv. M.

SIGNA.—A teaspoonful, to be repeated according to circumstances.

MATICO.

Source.—Matico—*maticæ foliæ*—are the dried leaves of the shrub artanthe elongata, of the natural order *Piperaceæ*—pepper order, and is a native of Peru. They are from two or eight inches long by an inch in breadth, strongly reticulated, and of a bright green on the upper surface and lighter in color beneath when fresh, with an agreeable aromatic odor and a strong astringent taste. They contain a trace of tannic acid, a peculiar acid, *artanthic*, a volatile oil, resin, and a very bitter principle—*maticin.*

Medical Properties and Action.—Matico is an aromatic tonic, an alterative stimulant, an internal hemostatic and local styptic. It has a special determination to the mucous membranes, and although as an internal remedy its astringens properties are not so well marked, it acts externally as a reliable hemostatic and styptic. The powder made from the underside of the leaf is more powerfully styptic than that from the upper side

Therapeutic Uses.—Matico in the form of powder, infusion and fluid extract, is employed in internal hemorrhages, epistaxis, atonic diarrhœa and diseases of the urinary passages, etc.; externally as a hemostatic in superficial hemorrhages, and also in leucorrhœa, in the form of an injection.

Dose.—Of powdered matico, ℥ss to ℥j, three times a day; of the infusion the dose is f℥ij; of the fluid extract the dose is f℥ss to f℥j.

Dental Uses.—The powder and tincture are valuable styptics in hemorrhage following the extraction of teeth, hemorrhage from leech bites and superficial wounds of mucous membrane.

MEDITRINA.

Meditrina is sea-water charged with electricity. It possesses antiseptic and deodorant properties. It is claimed that meditrina enters chemically into combination with the mephitic odors and gases, and in this way causes their destruction. Although it is not as powerful an antiseptic as many other agents of this class, there is no doubt of its being an excellent deodorant.

Dental Uses.—It has been recommended as useful in putrescent pulp-canals, alveolar pyorrhœa, and in stomatitis in the form of a mouth-wash; and also in all offensive conditions of the oral cavity.

MENTHOL—JAPANESE CAMPHOR.

(PEPPERMINT CAMPHOR.)

Formula.—$C_{10}H_{20}O$.

Derivation.—Menthol is the steroptene of peppermint oil, and is obtained from this oil either by long keeping or by being cooled at a low temperature. Chemically, menthol occupies the position of an alcohol, having in its composition four atoms more of hydrogen than the ordinary camphor, and containing the radical menthyl. It is in the form of a crystalline solid, composed of small white crystals of a peppermint odor and resembling sulphate of magnesia. It is imported as Japanese camphor, its chief source being the Japanese and Chinese peppermint oils. In a liquid state it has a specific gravity less than that of water. It is rendered liquid and volatile at a temperature one or two degrees below that of the body. It is sparingly soluble in cold water, liquefying slowly in water at 82° F., quickly at 120° F., but remains mostly as a separate body. It is only slightly soluble in water, but is freely soluble in alcohol, ether, glycerine and in the fixed and volatile oils.

Medical Properties and Action.—Menthol is anodyne, antispasmodic, and antiseptic. In doses of gr. 1/10 to 1/6 it steadies the contractions of an excited heart, and causes tranquillity, and at the same time slight cerebral drowsiness.

Half a grain may cause vomiting from gastric irritation, hence care should be observed in its administration, either internally or externally about the mouth. Its internal use is not advo-

cated, unless well diluted, but its principal use is as an external application.

Therapeutic Uses.—Menthol is said to prove as effectual as aconite, veratria and atropine for such diseases as neuralgia, brachalgia and gout; more so it is claimed by some. It is also used in chronic rheumatism and in headache. It is also applied in putrefactive wounds, as an antiseptic.

Dental Uses.—In dental practice, menthol has given satisfaction as an external remedy in facial neuralgia, odontalgia, as an obtunder of sensitive dentine, and as a local anæsthetic. For relieving the pain of sensitive dentine, a small portion of the crystals is applied to the sensitive surface, and in a few minutes the local anæsthetic effect is produced. As an analgesic antiseptic it has been employed in the treatment of decomposing pulps of teeth, necrosed teeth, etc., when dissolved in chloroform or in a volatile oil. When applied to mucous surfaces for its anæsthetic effect, a twenty to thirty per cent. solution is used, but it is more evanescent than cocaine. Menthol also forms an ingredient of a devitalizing mixture.

The oil of the ordinary peppermint is considered to be a germicide and antiseptic of considerable power and rapidity. It is readily diffusible, does not evaporate quickly, and is non-poisonous. It is useful in root-canals and fistulous tracts after removal of pulps, and for hypersensitive dentine.

DENTAL FORMULÆ.

For Facial Neuralgia and Odontalgia.

℞ Mentholi . . . . . gr.j
Spts. vini rectificati . ♏j
Olei caryophylli . . . . ♏x. M.

SIGNA.—For facial neuralgia, painted on the affected part. For odontalgia, applied on cotton to carious cavity.

For Neuralgia and Odontalgia.

℞ Mentholi . . . . . gr.v
Olei caryophylli (or oil of cajuput) . . . f℥j. M.

SIGNA.—To be painted on affected part, or, for odontalgia, applied on cotton.

Local Anæsthetic.

For Abscesses, Boils, Felons, etc.

℞ Chloroformi . . . . ℥v
Ether sulphurici . . ℥j
Mentholi . . . . . ℥ss. M.

SIGNA.—Use with spray apparatus.

For Odontalgia.

℞ Mentholi . . . . . gr.xv
Cocaine hydrochlor. gr.xv
Pul. opii . . . . . ℥j
Mucilag. acaciæ,
Pulv. altheæ . . . āā q. s. M.

SIGNA.—Introduce on a pledget of cotton.

For Odontalgia.

℞ Mentholi . . . . . 5 parts
Chloroformi . . . 8 parts. M.
SIGNA.—Apply on cotton.

Local Anæsthetic.

DR. A. W. HARLAN.

℞ Mentholi . . . . 2 parts
Ether . . . . . 15 parts
Chloroformi . . 100 parts. M.
SIGNA.—For injection, or applied on cotton about tooth.

For Odontalgia.

DR. SCHAEFFER.

℞ Phenol crystals . . . . 1 part
Mentholi . . . . . 3 parts.
Melt over a moderate heat.
SIGNA.—Apply to inflamed pulp.

For Pericementitis.

DR. J. P. BUCKLEY.

℞ Menthol . . . . . gr.xx
Chloroformi . . . . . f.℥j
Tincturæ aconiti . q.s. ad. f℥j. M.
SIG.—Dry gum and apply freely over the affected tooth for several minutes.

For Sterilizing Dentine.

DR. J. P. BUCKLEY.

℞ Mentholi . . . . . ℥j
Thymoli . . . . . ℥ij
Acidi carbolici q.s. ad. f℥iij. M.
Heat the phenol and then carefully add the menthol and thymol.
SIG.—Seal in the cavity for a week or two.

METHYLENE—BICHLORIDE OF METHYLENE.

Formula.—$CH_2.Cl_2$.

Derivation.—Methylene is obtained by the action on chloroform of nascent hydrogen. It boils at 104° F. and 40° C., and is a colorless, volatile liquid with the odor of chloroform. It was introduced in 1840 by Dr. B. W. Richardson. It is pleasant to inhale in the form of vapor. Its specific gravity is 1.344, and evaporates more easily than chloroform, and, the vapor being denser, it requires aless quantity than ether. It is soluble in alcohol and ether, and is frequently combined with other agents to lessen its cost.

Medical Properties and Therapeutic Uses.—Methylene possesses many of the dangerous qualities of chloroform when used as a general anæsthetic, and death results from syncope with dilated pupils. It was a favorite anæsthetic with Dr. Richardson, and Sir Spencer Wells believes that it has all the advantages of a complete anæsthetic with fewer drawbacks than any other. He gives it diluted with air by Junker's apparatus, and it is supposed that he employs a mixture of methylic alcohol and chloroform.

Despite the fact that so eminent a surgeon as Sir T. Spencer Wells uses methylene as an anæsthetic, and has continued to advocate its use for twenty years, a very few have followed his ex-

ample. This is because the statistics of mortality from this anæsthetic apparently show it to be considerably more dangerous than ether. Like chloroform it destroys life by its effects upon the heart.

METHYLIC ETHER—METHYL-ETHYLIC ETHER.

Formula.—$(CH_3)_2O$.

Derivation.—Methylic Ether is obtained by digesting methylic alcohol with strong sulphuric acid. It is a gaseous substance, of an ethereal odor, and under the name of *methyl-ethylic ether*, it has been used as a general anæsthetic. The methylic ether is prepared for use as methyl-ethylic ether by frequent washings in a strong solution of potassa, and is afterwards dissolved in absolute ethylic ether. In order that it may be fit for use, it is necessary to keep it for some time securely stopped.

Dental Uses.—According to Dr. B. W. Richardson, of England, methylic ether is a superior anæsthetic for dental operations —better, he says, than nitrous oxide gas, because it allows air to be given with it, and does not asphyxiate nor produce muscular spasms and syncope. Under its influence, the patient is in a state of semi-consciousness, but is not conscious of pain from an operation.

MICROCIDIN—MICROCIDINE.

Derivation.—Microcidin is a combination of naphthol and soda. Naphthol 25 per cent. and sodium naphtholate 75 per cent., one part being soluble in three parts of water. Microcidine does not corrode instruments or dressing materials, and is without odor or taste.

Medical Properties and Therapeutic Uses.—Microcidin has a very feeble toxicity, is caustic in large quantities, but in medicinal doses, even the largest required, is not irritating when applied to wounds as an antiseptic and disinfectant; it may also be used for toilet purposes. It reduces fever rapidly, and is excreted by the urine, which is rendered aseptic. It has been employed successfully in a large number of cases of infected and operative wounds. It is used in aqueous solution in the strength of 5 to 1000 (strong solution) and 3 to 1000.

Dental Uses.—As an antiseptic and disinfectant, microcidin may be employed in dental practice on gangrenous pulps, carious cavities, in pulp canals, and wounds and ulcers of mucous membrane; and as a disinfectant and antiseptic generally.

MORPHINA—MORPHINE.

Formula.—$C_{17}H_{19}NO_3 + H_2O$.

Derivation.—Morphine is the alkaloid which constitutes the chief narcotic principle of opium, the proportion varying from 10 to 15 per cent. It is present in opium in combination with meconic acid, and the meconate of morphia is separated by repeated macerations with water, after which the salt is decomposed by alcohol and water of ammonia, the latter precipitating the morphine and the former taking up the coloring matter as soon as it is freed from the alkali. The crystals of morphine are then boiled in alcohol and the solution filtered through animal charcoal. Morphine is in the form of white, or colorless crystals, which are inflammable and freely soluble in boiling alcohol, scarcely soluble in cold water, and somewhat so in boiling water. The salts of morphine, however, are freely soluble in water. It is without odor, and has a very bitter taste. Morphine differs somewhat in its mode of action from opium, which may arise from the peculiar state of combination in which it exists in opium. Morphine is more insoluble than its salts, and for this reason the latter are preferred for administration.

Medical Properties and Action.—Morphine is more powerful than opium; but it causes less vascular and arterial excitement, less headache and vertigo, less subsequent depression, less constipation, and often it will be retained on an irritable stomach, when opium or its tincture (laudanum) would be rejected.

Morphine is indicated when the object is to relieve nervous irritability and induce tranquillity. The effects of morphine differ according to the peculiarities of nervous constitution. The hypnotic effect may be produced and the stimulant action be confined to the heart; in some cases the excitant effect prevails, or the two effects may be equal. The excitant effect may counteract the hypnotic effect to a greater or less degree, resulting in insomnia with restlessness, or even delirium. Females appear to be more liable to its excitant effects than males; and

if there is present a highly emotional, excitable and energetic temperament, it causes great distress and dangerous effects when hypodermically administered. Long remarks that opium or morphine should not be given to infants or young children, as the prominence of the brain in childhood makes the child exceedingly susceptible to the influence of such drugs whose action is chiefly upon the brain and medulla.

Therapeutic Uses.—Morphine, in the form of salts, is employed as an anodyne and hypnotic in neuralgic affections, diseases of the heart, painful uterine affections, and in all cases of painful affections. (See Opium.)

The principal salts of morphine are the acetate, the hydrochlorate and the sulphate.

Morphinæ Acetas—Acetate of Morphine. Formula.—$C_{17}H_{19}NO_3,C_2H_4O_2+3H_2O$.

Derivation.—Acetate of Morphine is obtained by precipitating morphine from the hydrochlorate of morphine, by the aid of ammonia, the precipitate resulting being washed in distilled water and dissolved and neutralized by acetic acid, after which it is evaporated and dried by heat. It is in the form of a white or yellowish-white, amorphous or crystalline powder, altogether soluble in water and alcohol, and of a bitter taste.

Morphinæ Hydrochloras or Murias—Hydrochlorate or Muriate of Morphine. Formula.—$C_{17}H_{19}NO_3$, $HCl+3H_2O$.

Derivation.—Hydrochlorate or Muriate of Morphine is obtained by macerating opium in distilled water, evaporating to a small quantity, and adding chloride of lime, and concentrating the solution until it becomes solid when cool, after which it is pressed, washed with distilled water, again evaporated, cooled and pressed, and again dissolved in distilled water, when it is subjected to animal charcoal, to remove the coloring matter, filtered and precipitated by ammonia, the codeia of the opium remaining in solution. The crystals resulting are then dissolved in muriatic acid, and the morphine allowed to crystallize into hydrochlorate or muriate of morphine. It is in the form of snow-white, feathery flexible and acicular crystals of a bitter taste and silky lustre, and altogether soluble in water and alcohol.

Morphinæ Sulphas—Sulphate of Morphine. Formula.—$(C_{17}H_{19}NO_3)_2.H_2SO_4+5H_2O$.

Derivation.—Sulphate of Morphine is obtained by dissolving morphine in boiling alcohol, and saturating it while hot with sulphuric acid, the coloring matter being removed by animal charcoal; it is then boiled and filtered while at the boiling temperature. Upon cooling the sulphate is deposited in the form of white, feathery, acicular crystals, of a silky lustre, odorless, with a bitter taste and a neutral reaction. It is soluble in water and alcohol.

Medical Properties and Action of the Salts of Morphine.—The salts of morphine possess anodyne, hypnotic and antispasmodic properties, and are less stimulating, less convulsant, and more hypnotic and anodyne than opium, and they also produce less constipation, and less diaphoretic action than opium. After the administration or insertion of the ordinary dose, which is one-sixth to one-fourth of a grain, there is experienced a sense of heat and flushing of the face, which may be preceded by some pallor, a fulness of the head, giddiness, noise in the ears and frequently nausea, sometimes epigastric pain. The vertigo may cause a staggering walk and inability to maintain an upright position. Injection of the conjunctiva and contraction of the pupils occur at the same time that the cerebral effects are felt. The lips have a bluish appearance, the mouth and tongue dry, deglutition is painful and the voice becomes husky. During these symptoms the anodyne effects are manifested by the relief of pain and spasm, with perfect calmness of mind and tranquility. While the effect is generally hypnotic, yet in some cases there is extreme wakefulness, with great mental activity, and when sleep occurs, instead of being calm, the respirations are slow, noisy and labored, the patient being disturbed by dreams and visions. While the action of the heart is diminished in frequency, there is a considerable rise in the arterial tension. When a hypodermic injection of morphine has been made, there is experienced an itching of the nose, which may extend to the entire cutaneous surface. The skin, which is at first dry, becomes moist, from diaphoresis, which is sometimes profuse. The secretions of the mucous surface are also arrested as a primary effect.

If morphine is administered after a full meal, its effect is to suspend digestion for some time, and also to temporarily arrest the intestinal movements and diminish the urinal discharge, and

make its emission difficult on account of the temporary loss of contractile power of the bladder and of the ejaculatory muscles. When the narcotic effects of morphine decline, there is generally experienced headache, confusion of mind, anorexia and nausea. When a poisonous dose is administered, a profound state of narcotism quickly ensues, the pulse becomes slow and feeble, the respiration slow and indistinct, the skin cold and covered with perspiration, the face pale, blue and ghastly, the conjunctiva deeply injected, the pupils greatly contracted, the reflex movements entirely destroyed. Half a grain of morphia is the smallest dose which has proved fatal to an adult, but other cases are recorded where one grain destroyed life. It chiefly affects the cerebro-spinal functions, and causes death by paralyzing the respiratory muscles.

The opium or morphine habit is easily acquired and difficult to arrest after the system has become accustomed to opium or morphine, as an uneasy feeling and discomfort attends its non-continuance after a patient has indulged in the use of these drugs for some time, and is only relieved by further indulgence; some become so habituated to the use of morphine that they can withstand a dose of 10, 20 or 30 grains daily, the increase in the dose being necessary to obtain the effects of the drug where its use has become a habit.

The antidotes in cases of poisoning are the stomach pump, emetics, cold effusions, counter-irritation, strong coffee, active stimulants, atropine by hypodermic injection, electro-magnetism and artificial respiration.

Therapeutic Uses.—The salts of morphine are employed in all neuralgic affections, for the relief of pain from whatever cause, and to induce sleep; also in diseases of the heart, chronic gastritis, delirium tremens, tetanus, colic, spasms, dysentery, cholera, cough of pulmonary affections, cerebro-spinal meningitis, puerperal fever, convulsive diseases, vomiting, colica pictonum, diarrhœa, diabetes, gangrene, etc., etc. For hypodermic injection, the acetate of morphine is supposed to possess some advantages over the other salts, such as the sulphate and muriate, one of which is its greater solubility. Morphine is contra-indicated where there is a tendency to apoplexy and coma.

Dose.—Of the salts of morphine, gr. 1/6 grain to 1/4 grain.

One-sixth of a grain of either of the salts of morphine is equivalent to a grain of opium, or twenty-five drops of the tincture of opium (laudanum).

For hypodermic injections the dose of salts of morphia is gr. 1/8 to 1/6. The use of morphine hypodermically frequently lead to the morphine habit, which, once formed, is rarely abandoned; and which, independent of its fatal systemic effects, has very injurious effects upon the teeth—the enamel and dentine becoming thoroughly disintegrated, owing to the presence of erosive acids.

For endermic application, gr. 1/2 to j of morphine may be sprinkled on a surface (which has been blistered to remove the cuticle), over the seat of pain; but the hypodermic method is the most effectual.

Dental Uses.—For dental use the acetate of morphine and the muriate of morphine are preferable to the sulphate, on account of their greater solubility and greater chemical affinity with the tissues on which they are to act. The acetate of morphine is also preferred to the other salts as an ingredient of nerve paste for destroying the vitality of the pulps of teeth, on account of its chemical and mechanical compatibility with the pulp tissue, giving relief as an anodyne when the sulphate would irritate. Concerning the action of morphine when combined with arsenious acid, its effect is anodyne, modifying the irritant action of the arsenic, and preventing to a considerable degree the intense pain which follows its application to vitalized structures. Besides its use in devitalizing mixtures and as an obtunder of sensitive dentine, morphine is employed for the temporary relief of odontalgia, for such a purpose being combined with carbolic acid, sweet spirits of nitre, oil of cloves and other anodyne agents.

A paste made of acetate of morphine and creasote (or carbolic acid) is much used for obtunding the sensitiveness of dentine. A thin paste, made of acetate of morphine rubbed up with oil of cloves, is an excellent application for exposed pulps; also a mixture of acetate of morphine, grs. v; oil of cajuput, f℥j; applied on a pledget of cotton. The latter is also effective for the pain following tooth extraction; it is applied on cotton in the alveolar cavity.

For internal administration in facial and other neuralgias, morphine is combined with atropine in the proportion of atropine,

gr. 1/120 to 1/100, morphine, gr. 1/6 to 1/4; hypodermically injected. Morphine in combination with carbolic acid is also employed to relieve the pain of an exposed and painful pulp.

DENTAL FORMULÆ.

For Odontalgia.

WHITE.

℞ Morphinæ acetatis . . gr.xx
Olei caryophylli,
Spiritus ætheris nitrosi āā ℥ij. M.
SIGNA.—Apply on a pellet of cotton.

For Odontalgia.

℞ Morphinæ acetatis . . gr.xx
Creasoti (vel acidi carbolici) . . . . . ℥ij. M.
SIGNA.—Apply to carious cavity on a pellet of cotton.

For Devitalizing Pulps of Teeth.

℞ Morphinæ acetatis . gr.j
Acidi arseniosi . . . gr.ij
Creasoti . . . . . q.s. M.
Fiat massa.
SIGNA.—Apply a sufficient quantity to exposed surface of pulp, on cotton. (For other devitalizing mixtures see Arsenious Acid.)

For Itching of Inflamed Surfaces

℞ Morphinæ sulph . . . gr.vj
Sodii boratis . . . . ℥ss
Aquæ rosæ . . . . f℥viij.M
SIGNA.—To be used as a lotion.

For Abraded Surfaces of Teeth.

DR. A. C. HUGENSCHMIDT.

To prevent pain of friction.

℞ Morphinæ murias . . gr.ij
Mur. cocaini . . . . gr. ij
Sodii boras . . . . ℥j
Mellis . . . . . ℥j. M.

To Relieve the Pain Following Extraction of Teeth, and a Local Anæsthetic.

℞ Morphinæ . . . . . gr.vj
Tincturæ aconiti,
Chloroformi,
Alcoholis . . . . āā f℥j. M.
SIGNA. . Apply on cotton, or with an applicator, as a local anæsthetic. (See Formulæ under Arsenious Acid.)

MYRRHA—MYRRH.

Source.—Myrrh is a gum-resinous exudation from a small, shrubby tree—Balsamodendron Myrrha, of the natural order *Amyridacea*, growing in Arabia, and the northeastern coast of Africa. It is obtained in the form of small, irregular fragments or tears, or in larger masses, composed of agglutinated portions. The juice exudes spontaneously from the stem of the tree, and concretes upon the bark. When pure, myrrh is of a reddish-yellow or reddish-brown color, translucent, with a strong, peculiar fragrant odor and a bitter aromatic taste, brittle and pulverizable. Its powder is of a light yellow color; when of a dark color it is impure. When powdered myrrh is rubbed up for fifteen minutes with an equal weight of muriate of ammonia and

fifteen times its weight of water gradually added, and it dissolves quickly and entirely, it may be considered pure.

Medical Properties and Action.—Myrrh is stimulant, astringent, expectorant and emmenagogue. It stimulates the digestive organs and improves the appetite. In large doses of a half ounce, it causes a burning sensation in the stomach, increased arterial excitement, and profuse diaphoresis, with a great influence on the urinary passages. It diminishes discharges from mucous membrane when internally administered, and is a useful external application for relaxed tissues.

Therapeutic Uses.—Myrrh is internally administered in chronic catarrh, humoral, asthma, amenorrhœa, chlorosis, leucorrhœa, chronic bronchitis, etc., etc.; and in combination with chalybeates and aloes in uterine affections.

Locally, myrrh is applied to inflamed, ulcerated and aphthous surfaces.

Dose.—Of powdered myrrh, gr. x to ℥ss, in pill or suspended in water.

TINCTURE OF MYRRH.—*Tinctura Myrrhæ* (myrrh, ℥iij; alcohol, Oij). *Dose.*—f℥ss to f℥j. It is used internally and externally; it cannot be mixed with water except with a large percentage of alcohol, as water precipitates the resinous portion.

Dental Uses.—Myrrh, in the form of the powder and tincture, is employed as a local application to inflamed ulcerated and spongy gums, ulcerations of mucous membrane of the mouth and throat, in the form of a gargle; also in alveolar pyorrhœa, mercurial stomatitis, indolent ulcers, aphthous sore mouth of children. The diluted tincture forms a stimulating gargle or mouth-wash, and the powder is employed as an ingredient of dentifrices, for its stimulating and astringent properties.

DENTAL FORMULÆ.

Astringent Mouth-wash.

℞ Myrrhæ (tinct.) . ℥vj
Rad. iridis . . . ℥vj
Benzoini . . . ℥iij
Cort. cinchonæ . ℥iv
Ext. krameriæ . ℥ss
Capsici . . . . ℥j
Spt. rectificat. . Cong.j. M.
Macerate for 7 days and filter; to filtrate add 15 ounces of simple syrup.

(For other Mouth-washes and Lotions see Index to Diseases, etc.)

Van Valzah's Obtunder and Local Anæsthetic.

℞ Pip. menthol . . . . ℥ij
Tincture myrrh . . ℥vj
Alcohol . . . . . ℥x. M.

MYRTOL—RECTIFIED MYRTLE OIL.

Derivation.—Myrtol is obtained from the leaves and berries of the Myrtus Communis (Myrtaceæ), an evergreen shrub native of the Mediterranean countries. It is a volatile oil containing various terpenes, cineol, and a camphor-like substance.

Medical Properties and Therapeutic Uses.—Myrtol is a disinfectant and antiseptic, and causes no irritation to the skin. Upon a denuded or abraded surface it causes a slight burning sensa; tion, which soon passes off. It is claimed that a 9 per cent. solution of myrtol will completely arrest the growth of the micro-organisms of pus; and myrtol will also prevent the decomposition of organic matters. Internally myrtol promotes digestion, but large doses cause headache and nausea. It communicates a violet odor to the breath and urine, and is eliminated from the system by the lungs and kidneys.

Myrtol has been employed with success as a disinfectant for wounds and ulcers; also in cutaneous diseases of a vegetable parasitic origin, and as a local remedy in psoriasis. Internally, myrtol has proved useful in the destruction of intestinal worms; also in chronic bronchitis, gangrene of lungs, pulmonary tuberculosis, chronic pyelitis and cystitis; also in passive hemorrhage.

Dose.—Gr. iv.

Dental Uses.—Myrtol is employed in dental practice as a disinfectant of pulp canals and as an antiseptic for gangrenous pulps, also to destroy the growth of micro-organisms in alveolar abscesses, and to disinfect carious cavities in teeth, and as a mouth-wash in inflammation of the mucous membrane, etc., etc.

NAPHTHALENE—NAPHTHALIN.

Formula.—C_{10} H_8.

Derivation.—*Naphthalene* may be obtained by subjecting coal-tar to a distillation, when it passes over the coal naphtha. It is purified by subliming it with charcoal, and is then in the form of a white crystalline body. It has a slightly aromatic taste and the odor of coal-tar. While it has no poisonous effect on man and the higher animals, it is destructive to fungi spores, small insects, etc. It is soluble in alcohol, ether, naphtha and the oils, but in-

soluble in water. As an expectorant it has been used in humeral asthma and in chronic pulmonary catarrh, in doses of from gr. viii to xxx, in syrup or emulsions, and as an ointment in skin diseases of a scaly nature; also as a vermifuge in doses for adults of gr. xv, followed immediately by 2 ounces of castor oil. Naphthalin is a powerful antiseptic, and can be used as a substitute for iodoform, with the advantage of not producing any constitutional action. Its application causes a slight pain of short duration. As an antiseptic and disinfectant, it is applied to indolent ulcers, septic and unhealthy wounds, ulcerating cancerous growths, phagedenic ulcers, etc. It is said that its antiseptic property is superior to that of carbolic acid, and as an odorless preparation, it will no doubt become a desirable substitute, as it has not corrosive action and will not injure textile fabrics. To deodorize naphthalin, simple mixture with benzoic acid or tincture of benzoin does not suffice; but if mixed with benzoin and then sublimed, it loses its tarry odor and acquires a pleasant smell which it retains.

NAPHTHOL—NAPHTHOL.

Formula.—$C_{10}\ H_8O = C_{10}\ H_9,OH$.

Derivation.—Naphthol is an alcohol derived from *Naphthalene* ($C_{10}H_8$), which is obtained from coal-tar in the form of white shining crystals of a strong, disagreeable odor, soluble in alcohol, but soluble in 1000 parts of water, and 0.75 parts of alcohol. (See Naphthalene.)

Medical Properties and Therapeutic Uses.—There are two forms of Naphthol, known as *a* and *b* Naphthol, the latter being employed medicinally on account of its less irritating and injurious action. It is in the form of light-brown crystals, soluble in hot water, and possessing antiseptic properties, and employed internally and locally in the form of ointment with vaselin dissolved in alcohol, ether or olive oil, in the proportion of two per cent. It is employed in parastitic diseases of the skin, and as a disinfectant in pus pockets and suppurating wounds, and as a general antiseptic.

Hydronaphthol.—The chemistry of this agent, which is supposed to be a form of *b* naphthol, is not well known. It is in the

form of light fawn-colored crystalline flakes, have a feeble odor and taste. As a germicide, it apparently possesses the power of preventing the development of germs and their spores. It resembles capsicum in possessing slight stimulating and counter-irritant properties, but is not so powerful.

Dental Uses.—Hydronaphthol is employed for treating the canals of pulpless teeth, pericemental inflammation of septic origin, especially in the early stages before pus has formed. Dr. Jas. Truman recommends a solution of 1: 1000 of water for injection into pulp-canals; and Dr. E. C. Kirk recommends a paste of hydronaphthol and glycerine, pumped into a thoroughly cleansed pulp-canal in pericemental inflammation from septic causes, to remove the soreness and inflammation in a few hours; it should be retained by a temporary filling of gutta percha. It is also recommended as an ingredient for a mouth-wash for diseased gums and mucous membrane. It is also employed as a mouth-wash in the strength of 1:0.75 alcoholic solution; and for disinfecting root-canals and in pyorrhœa alveolaris in solution of a strength of 1:200 or 1:300. A saturated solution in hot water is generally strong enough for topical use.

Alpha-oxynaphthoic acid (or *alpha-naphthol-carbonic acid*) is prepared in a similar manner to salicylic acid, naphthol being substituted for phenol. Its formula is $C_{10}H_6$,COOH. It is obtained by bringing together, under strong pressure, and at an elevated temperature, alpha-naphthol, sodium and carbonic acid gas. It is nearly insoluble in water, but soluble in the alkalies and alkaline carbonates, forming salts, which are colorless and of neutral reaction, and more soluble in hot and cold water than the acid itself. It is antiseptic and germicide, experiments upon bacteria giving favorable results.

DENTAL FORMULÆ.

Antiseptic and Stimulant Mouth-wash.

For use especially in Alveolar Pyorrhœa.

Dr. Chas. B. Atkinson.

℞ Hydronaphthol . . . . . ʒij
Tinct. calendulæ . . . . . ʒiv
Aquæ dest. q. s. ad. . . . . ʒviij. M.
Signa.—Use daily.

Fragrant and Antiseptic Mouth-wash.

DR A. W. HARLAN.

℞ Saffrol	360	min.
Oil of pinus pomilia	120	min.
Oil of curacoa	120	min.
Oil of vetivert	6	drops
Oil of wintergreen	24	drops
Oil of anise, Saxony	6	drops
Oil of rose geranium, Af.	6	drops
Naphthol	60	grs.
Deodorized alcohol	24	f. oz.
Solution of saccharine	1/2	f. oz.
Glycerine	8	f. oz.
Purified talcum	2	troy oz. M.

NERVOCIDINE.

Nervocidine is an alkaloid anæsthetic introduced in 1903 by Dr. Dalma, of Hungary.

Derivation.—It is obtained from an Indian plant called Gasubasu, and is in the form of a yellowish powder containing N, C, H and Cl; is very soluble in water, and slightly soluble in alcohol and ether; when moistened it becomes jelly-like and viscid; on the addition of alkalies the solution becomes opaque.

Medical Properties and Action.—Possessing toxic properties, when internally administered, it causes paralysis of the nerve centres, and death occurs from paralysis of the motor centres, and thus, indirectly, through paralysis of the heart. The method of applying it topically, on account of its viscosity, is to moisten the surface of a small piece of spunk with the nervoicidine, and holding this with the plyers to place it on the sensitive surface avoiding pressure.

Dental Uses.—Nervocidine is recommended for anæsthetizing or obtunding sensitive dentine and the obtunding of the dental pulp. The application is permitted to remain from 24 to 48 hours; if allowed to remain in the tooth cavity longer than 3 days a return of sensitiveness may occur. The same quantity of nervoicidine is applied for obtunding sensitiveness of dentine and the dental pulp, as of arsenious acid. It will not discolor the tooth structure, and does not cause destruction of the gum tissue when coming in contact with it. For the painless excava-

tion of a carious tooth-cavity, a paste is recommended consisting of 10 grains of nervocidine and 10 grains cocaine hydrochorate dissolved in 2 drachms of oxysulphate of zinc, with sufficient powder of uncalcined oxide of zinc to form a paste, is introduced into the dried cavity and permitted to remain from 2 to 48 hours.

Nervocidine is not used hypodermically.

NITROUS OXIDE—PROTOXIDE OF NITROGEN.

LAUGHING GAS.

Formula.—N_2O. Sp. gr. compared with air is about 1.6.

Derivation.—The discovery of Nitrous Oxide Gas was made by Dr. Priestly in 1776, and scientific investigation demonstrating its respirability, by Sir Humphrey Davy, the results of which were published some twenty years afterward. To Dr. Horace Wells, a dentist of Hartford, Connecticut, is due the credit of having demonstrated its property as an anæsthetic agent for the relief of pain during surgical operations, in the year 1844.

Nitrous oxide is obtained by heating the salt nitrate of ammonia in a glass retort until it melts, and then boils, dissolving into a vapor of water and into a permanent gas. The salt nitrate of ammonia is obtained in three forms—the crystallized, the granulated and the fused. The fused form is prepared by melting the crystallized nitrate of ammonia, and allowing it to solidify on cooling; the granulated is prepared by evaporating the solution to a density sufficient to solidify on cooling, and agitating the mass until it becomes cool.

As it is very important to use a pure form of the nitrate of ammonia in the generation of nitrous oxide gas, the salt, either in the fused or granulated state, may be tested by heating it on platinum, when the nitrate, if pure, should volatilize perfectly. It may also be tested by a few drops of chloride of barium, which should not give a precipitate when added to the nitrate of ammonia; should it do so, then sulphuric acid is present; or the nitrate of ammonia may be tested by a solution of nitrate of silver which will also give a precipitate, if chlorine is present. The test with nitrate of silver may be made by dissolving a drachm of the nitrate of ammonia in half a glass of distilled water and adding a few crystals of the nitrate of silver. If the nitrate of ammo-

nia is pure, the solution will remain perfectly clear; but should chlorine be present, it will show a clouded appearance, and should be discarded, as it is not fit to generate the gas from.

The salt nitrate of ammonia is a white, crystalline substance, formed by neutralizing dilute nitric acid by means of carbonate of ammonia, and is so constituted as to be resolved into nitrous oxide and water. A pound of the salt will generate about thirty gallons of the gas. In generating nitrous oxide gas, care must be taken to preserve its purity; consequently it becomes important to maintain, as nearly as possible, an equal temperature during its manufacture; and should any *nitric oxide*—binoxide of nitrogen—be formed, which may be done by too high a heat under the retort, it is necessary to remove it and other impurities, by the aid of solutions of caustic potash and copperas; the caustic potash neutralizing any free nitric acid present, and the copperas removing either chlorine or nitric oxide. The salt nitrate of ammonia is perfectly fused at 226° F., emits white fumes at 302° F., and begins to evolve gas at 460° F. At 500° F. the impurity, *nitric oxide*, is given off; hence the temperature during the process should not be permitted to rise above 482° F., which can be determined by thermometers prepared for the purpose. No red fumes should pass from the retort.

Liquefied Nitrous Oxide.—Nitrous oxide gas, as principally used at the present time, is in the form of condensed gas, being liquefied and solidified under great pressure, and secured in iron cylinders, from which it escapes into an inhaling bag when needed for use by turning a stop-cock. Liquefied nitrous oxide is a colorless fluid, having specific gravity of 0.908, and at a very low temperature (148° F.) it congeals into a transparent crystalline solid. It is prepared by condensing the gas by a pressure of fifty atmospheres at a temperature of 40° F., and may be kept in the iron cylinders for an indefinite period. The advantages of the condensed form of the gas are its purity, convenience for use whenever needed, the large supply which can be kept for use, and the freedom from deterioration, notwithstanding its age.

Nitrous oxide is an elastic, colorless gas, with a faint, but agreeable odor and a sweetish taste, which it imparts to water. Under a pressure of fifty atmospheres at about 40° F., it becomes

a clear, colorless liquid, and at about 148° F. below zero, it freezes into a beautiful, clear crystalline solid. By the evaporation of this solid, a degree of cold may be produced far below that of carbonic acid bath in vacuo, or lower than 170° F. The washing of nitrous oxide gas, and the retention of it over water for any length of time, is attended with considerable loss, as much of it is absorbed, especially if the water is cold; such loss may be avoided to a great extent by using water of an elevated temperature or a strong solution of common salt. The impurities of nitrous oxide gas are air, water, nitric oxide or binoxide of nitrogen, chlorine and hyponitric acid. The mixture with air which may occur in the receiver, or when the patient is inhaling the gas, merely dilutes it as does also the vapor of water. Nitric oxide, however, is a dangerous impurity, and with others may be generated even when pure nitrate of ammonia is used in preparing the gas; this impurity is also one of the most difficult to separate from the gas. Like nitrous oxide, nitric oxide is a colorless gas, lighter and less soluble in water, and if it is generated is liable to pass through the washing solutions into the gasometer or receiver; nitric oxide, however, need not be generated if the proper care is observed with regard to the degree of heat under the retort which contains the nitrate of ammonia.

Chlorine is also a dangerous impurity, and may be set free if the salt nitrate of ammonia contains muriate of ammonia (sal-ammoniac) and chloride of ammonium. To prevent such contamination, the tests of the salts before referred to may be made. Nitrous oxide gas supports combustion with almost the same promptness as pure oxygen; and although nearly identical in constitution with atmospheric air, it differs from it both in the proportion of its constitutional elements and in the manner of their association. Nitrous oxide contains about one-third of oxygen to two-thirds of nitrogen, while atmospheric air has only about one-fifth of oxygen to four-fifths of nitrogen.

Again, in nitrous oxide the elements nitrogen and oxygen are in chemical combination with each other, while in atmospheric air there is no apparent chemical union whatever.

Medical Properties and Physiological Action.—Concerning the therapeutic application of nitrous oxide, Dr. L. Turnbull says: "Neuralgia, uncomplicated, will sometimes be relieved by a few

inhalations of nitrous oxide gas. Nervous aphonia, this peculiar form of loss of power over the voice, usually the result of hysteria, will be much improved by the patient inhaling sufficient nitrous oxide gas to produce a partial loss of sensation and muscular relaxation. Local paralysis has been benefited, where there was no brain lesion, by the gentle stimulation by the first stages of the gas, or the tingling and stimulating effect on the muscles. Asthma, when of a spasmodic character is often much improved by causing the patient to pass into the stage of relaxation, employing it every other day for a week or two. It also tends to expand the lungs." Dr. George J. Ziegler found the solution or the gas, in water, of much utility in diseases of the lungs, kidneys, and other affections of this class. Dr. M. Price claims to have employed nitrous oxide gas in many cases of phthisis with advantage, and a number of dentists have been told by consumptive patients that they have been benefited by the inhalation of nitrous oxide gas.

Nitrous oxide gas is not only the most pleasant, but is, combined with oxygen, the safest general anæsthetic in use, and the greatest objection to its administration is the very short anæsthetic stage which it induces, unless the inhalation of the gas be continued, which is impossible in operations upon the mouth. When inhaled, the first effect is dizziness, with ringing noises in the ears, a tingling sensation, extending to the extremities, an uplifting of the whole system, followed by fulness or expansion of the chest, and a loss of sensation throughout the entire body. According to the temperament, the stage of excitement is transient or prolonged; in some cases there are strange illusions, with a form of intoxication, which may be manifested by declamation, singing, laughing or crying, or melancholy, with a disposition at times to assault all near. Such effects, if the administration is not interrupted, soon pass off. For surgical operations the gas is given with less admixture of air, and the inhalation persisted in until the stage of excitement is overcome and insensibility produced, when the face becomes exceedingly pale, the respirations, at first shallow, become deep and stertorous, the jaw fixed, the eyes protruding, and a bluish and purplish color about the lips and face, the patient presenting a very alarming and death-like appearance, a condition of which Bartholow says: "So

far as the exterior phenomena can afford any indication of the nature of the action, is *an asphyxiated state.* The blood ceases to be oxygenated, carbonic acid accumulates, and the centres of conscious impressions are rendered inactive in consequence of the deficient supply of oxygen and the excess of carbonic acid. The rational indications of the nature of the narcosis produced by nitrous oxide are confirmed by physiological experiment. It has been found that the exhalation of carbonic acid is decidedly diminished by the inhalation of nitrous oxide, and that animals live no longer in an atmosphere of this gas than in an atmosphere of hydrogen." The same author speaks of the fatal cases that have occurred, as being with propriety attributable to the lethal action of this gas, and refers to various cases under his own observation in which nervousness, vague mental symptoms and headache have been experienced after the inhalations; at the same time he pronounces nitrous oxide to be almost free from danger. Prof. H. C. Wood believes that nitrous oxide acts as an anæsthetic by shutting off oxygen. A prominent feature of nitrous oxide gas is the rapidity with which it produces anæsthesia, causing cyanosis the result of asphyxia with its anæsthetic action, which is combated by its combined inhalation with oxygen, which combination also permits of a longer state of unconsciousness like other general anæsthetics. It is also administered prior to the inhalation of ether to shorten the anæsthetic period and to prevent the excitement induced by ether. Nitrous oxide in its pure form induces complete anæsthesia in from two to five minutes, with a rapid recovery, affecting the emotions, especially laughter, with reflex activity. When mixed with air there is greater excitement and the anæsthetic effect is delayed; where as combined with oxygen the asphyxia is prevented without interfering with the anæsthesia. There is no doubt but that the prompt action of nitrous oxide gas, and the rapid subsidence of the narcosis, have much to do with its safety, and account for the impunity with which it is used. According to recent investigations, nitrous oxide gas has no direct effect upon the heart and vasomotor system, but indirectly causes a rise of arterial pressure by the slight asphyxia it produces. Although the anæsthesia may be due in a measure to the non-oxygenation of the blood during the presence of this gas in the blood, yet it causes anæsthesia

aside from such influence by a direct action on the cerebral cortex. The after-effects are rarely disagreeable, and generally a slight dizziness which soon passes off. Nitrous oxide gas has the advantages of safety; also rapid anæsthesia, which is generally induced in from thirty seconds to a minute and a half, insensibility often occurring before complete unconsciousness; also the pleasant odor and taste, thereby preventing repugnance and nausea; and the complete recovery from its influence without unpleasant after-effects. It generally requires six gallons or less to produce anæsthesia with nitrous oxide gas; hence the rubber bag from which it is inhaled should have a capacity of about eight gallons. Nitrous oxide gas is a very useful anæsthetic in all minor operations, such as the extraction of teeth, opening an abscess, boil or felon, or even amputating fingers, etc. The disadvantages it possesses are its brevity of action, and the difficulty of carrying it from place to place; but its advantage is its almost absolute safety, as few deaths have been caused by it directly.

Mode of Administration.—The most improved apparatus consists of an iron cylinder containing 100 gallons or more of the condensed or liquefied nitrous oxide, to which is attached a rubber gas bag and inhaling tube with a double valve and mouth-piece. The patient, for dental operations, is seated in a suitable chair which will admit of the back being lowered to such a degree as will bring the patient to an almost horizontal posture, and the head well supported. A piece of India-rubber or a firm cork to which a thin, strong cord is attached, to prevent its slipping down the throat, is placed between the teeth, so as to prevent the closure of the jaws, for, unlike chloroform and ether, the muscles become rigidly contracted under the influence of this gas; such a prop also prevents injury to the front teeth by the patient biting too hard on the mouth-piece of the inhaling tube. The patient is then directed to breathe deeply and regularly, the nose being held, to prevent the admixture of atmospheric air, and the same precautions observed as are necessary when administering ether or chloroform. (See Ether.) The anæsthetic state, or "surgical period," as it is termed, is generally manifested by snoring, although this symptom does not invariably occur; when it does, however, it indicates a state of profound anæsthesia, to

which it is unnecessary to carry the patient when performing many minor surgical operations.

As more or less excitement follows the inhalation of this gas, when it is largely mixed with atmospheric air, such a condition is either prevented or abbreviated by holding the nose of the patient during the inhalation. The patient should not partake of food for at least two hours before the administration of the gas, but at the same time should not be in a weakened condition for want of it; and the dress, if tight, should be previously loosened, and as soon as the operation is completed the head should be gently moved to one side, to allow the blood to escape from the mouth. Fresh air should then be admitted into the room, and the patient supplied with it by means of a fan. (See Administration of Anæsthetics.)

Therapeutic and Dental Uses.—According to the investigations of Dr. Ziegler, nitrous oxide is an efficient restorative when administered either in its gaseous state by the lungs, or in conjunction with liquids by the alimentary canal. He recommends the use of this gas in moderate quantities, so as not to generate too much carbonic acid. Regarding nitrous oxide and oxygen as of primary importance in asphyxia, and the natural antidotes to narcotizing agents and asphyxiated conditions, he advocates their use whenever practicable, either alone or in combination with heat, and claims that they will often save life in apparently hopeless cases.

The rapid action of nitrous oxide and the transient nature of its effects on the system, render it a very useful anæsthetic agent for all minor surgical operations—such as extracting teeth, lancing abscesses, devitalizing nerves of teeth, etc., etc. It has also been successfully employed in the performance of some capital surgical operations, where the anæsthesia has been kept up from fifteen minutes to half an hour.

Nitrous Oxide and Oxygen or Air, Combined.—Oxygen gas may be combined with nitrous oxide gas with great advantage; also nitrous oxide and atmospheric air, although the good effects of the latter mixture are not so well marked as those of former mixture, yet both mixtures lessen the unpleasant symptoms which may ensue from pure nitrous oxide. It is claimed for these mixtures absence from all blueness of the features, regular, softly-

snoring breathing, muscular relaxation, and absence of conjunctival reflex; also that the jerky muscular movements, especially common to children under nitrous oxide, are completely abrogated; in fact that the presence of oxygen, or air with nitrous oxide renders the anæsthesia much safer. Dr. Hewitt claims that these mixtures are better than pure nitrous oxide for children, anemic and debilitated patients, for those who have previously exhibited great susceptibility, and are consequently difficult to manage in dental practice for the reason of the short period of available anæsthesia, those who under nitrous oxide alone have experienced very disagreeable sensations, patients advanced in years, those with large tonsils, and those suffering from heart or lung diseases. An apparatus is now manufactured, based on the ideas of Dr. Hewitt, but with certain modifications, for combining nitrous oxide and oxygen gases or air, which are very satisfactory in carrying out this "non-asphyxial method," as this mixing together of the two gases, or air, and their administration is called. The anæsthesia is produced by the nitrous oxide alone, the office of the oxygen, or the air, being that of a modifier of the effects of the nitrous oxide, as there is no danger of asphyxia from such combinations. There are two cylinders in this apparatus, one for the nitrous oxide and the other for the oxygen, and a mixing chamber in which the combination occurs, and from which the combined gases flow to the inhaler. If nitrous oxide alone is used with this apparatus, there is always on hand the oxygen, which the opening of a valve will admit at once to overcome any tendency to asphyxiation which may develop.

Dr. Hewitt's conclusions on the administration of definite mixtures of Nitrous Oxide and Air and of Nitrous Oxide and Oxygen, are as follows: "1. When pure nitrous oxide was administered to the human subjected in such a manner that no free oxygen gained admission during the administration, certain phenomena arose which might be regarded as being either (1) phenomena of anæsthesia or (2) phenomena of asphyxia. 2. The anæsthetic phenomena of nitrous oxide, although apparently very different from those of ether or chloroform, were in their essential features remarkably similar. 3. The most conspicuous of the asphyxial phenomena of pure nitrous oxide were (1) embarrassed and deeply stertorous breathing; (2) cyanosis; and (3)

anoxemic convulsion. All these might be eliminated without interfering with the anæsthetic effects of the gas by administering with it certain proportions of oxygen, either pure, or as atmospheric air. 4. There were other less obvious asphyxial phenomena, such as wide dilatation of the pupils, swelling of the tongue and adjacent structures, and rapid cardiac action, which, like the more important symptoms above referred to, might be prevented or modified by similar means. 5. Under the influence of pure nitrous oxide breathing became deeper and quicker than usual. At the end of from 55 to 66 seconds its rhythm became altered either by (1) obstructive stertor, (2) anoxemic convulsion attacking the respiratory muscles, or (3) both conditions combined. Paralytic cessation of breathing was very rare, and when it occurred was dependent quite as much upon cerebral anemia from defective circulation as upon the presence of unoxygenated blood in the vessels supplying the respiratory centres. 6. The deep and obstructive stertor of pure nitrous oxide narcosis was not met with when employing mixtures containing moderate percentages of air or oxygen. With such mixtures only soft snoring breathing was produced. When the percentage of air or oxygen was considerable (thirty per cent. of air or thirteen per cent. of oxygen) respiration became less and free from all obstruction. 7. The most marked cyanosis was met with when very small percentages of air (from three to six per cent.) or oxygen (under three per cent.) were administered with nitrous oxide. As the percentage of air or oxygen increased cyanosis lessened, till with 30 per cent. of air it was very slight, and with 11 per cent. of oxygen it disappeared altogether."

Dr. Hewitt goes on to state that the same favorable results occurred with the mixture of air or oxygen in regard to such symptoms as anoxemic convulsion, reflex excitement movements, etc., which were much more pronounced when pure nitrous oxide was administered; also that the duration of the anæsthesia was found to be longest after the administration of mixtures containing from 3 to 11 per cent. of oxygen, the maximum duration having been attained with 7 per cent. mixtures; and that with nitrous oxide and air mixtures the resulting anæsthesia was distinctly longer than with pure nitrous oxide, but the results were very uncertain in these cases. The shortest anæsthesia was re-

corded with nitrous oxide alone and with nitrous oxide mixtures containing 30 per cent. of air. His best results were obtained with mixtures of nitrous oxide and oxygen, the next best with nitrous oxide and air, and the worst with nitrous oxide free from air or oxygen. He also found that there was no one mixture of nitrous oxide with air or with oxygen which would successfully anæsthetize every patient; also that mixtures containing 5, 6, or 7 per cent. of oxygen were the best for adult males, and mixtures containing 7, 8 or 9 per cent. the best for females and children; that the next best results to those last mentioned were to be obtained by mixtures of nitrous oxide and air, from 14 to 18 per cent. of the latter being advisable for anæsthetizing men, and from 18 to 22 per cent. for anæsthetizing women and children.

At a recent meeting of the Paris Academy of Medicine, a method was suggested to obviate the disagreeable incipient effects of nitrous oxide gas, which are often manifested by bad dreams and the perception of noises aroused in the mind of the patient when still in a state of partial consciousness, by soothing strains of sweet music by a powerful phonograph, the tubes of which are applied to the patient's ears before the gas is administered and during the operation of extracting teeth. (*See Anæsthetics.*)

NOVOCAIN.

Derivation.—Novocain is a synthetical product, representing the hydrochloride of paraminobenzoyldiethylaminoethanol and was discovered in 1905 by Professors Einhorn and Uhfolder. Novocain is in the form of colorless needle-shaped crystals readily soluble in one part of water and thirty parts of alcohol. The solution of Novocain can be boiled without its decomposing, and it has a neutral reaction on litmus paper, with no irritating action on the skin.

Medical Properties and Action.—Experience in the use of Novocain shows that intravenous injections of solutions decrease arterial pressure, but it is not stated whether this phenomenon is a transient or permanent one. Such an action is supposed to be due to the influence of novocain on the vaso-motor centres. Novocain inhibits respiration. Experiments on animals have shown the fatal dose to be 5 3/4 to 6 2/3 grains. Prof. Brandt employs Novocain in general surgery in solutions of

from 1/4 to 1 per cent. to which he adds from five to ten drops of adrenalin solution 1:1000. It has been shown by Biberfeld, Heineke and Laewen that Novocain is about six to seven times less poisonous as compared with cocain. It combines with adrenalin in any proportion without interfering with the physiological action of the Adrenalin, and is readily absorbed by mucous membranes. Biberfeld and Braum have shown that the adrenalin anemia on the one hand and the Novocain anæsthesia on the other hand were markedly increased in their total effect upon the tissues; consequently a smaller quantity of this combination is required to produce the same therapeutical effect as a larger dose of each individual drug would produce when injected separately. It is also claimed that the injection of the solution of Novocain and adrenalin is confined wholly to the injected area, and that, as a consequence, general effects are rarely caused.

Dose.—The dose Novocain is one-third of a grain for a single hypodermic injection.

Dental Uses.—Novocain, especially when combined with adrenalin is regarded as a very valuable local anæsthetic, and, although it does not cause insensibility as rapidly as cocain, it produces an anæthesia of longer duration. An injection of ten drops of a 2 per cent. solution of Novocain produces a diffuse anæsthesia lasting for about twenty minutes; and the same quantity with the addition of 1/1500 grain of adrenalin chloride increases the anæsthesia to a period of about one hour. As the effects of an injection of Novocain combined with adrenalin chloride are confined to the injected area, having a marked vaso-constrictor action, this factor prevents the ready absorption of both agents and therefore prevents poisonous results.

DENTAL FORMULÆ.

A Local Anæsthetic.

DR. HERMAN PRINZ.

℞ Novocain . . . . . gr. x
Sodium chlorid . . . gr. v
Aquæ destil. . . . . ℥j. Boil.

SIGNA.—To each syringeful (30 minims) add one drop of adrenalin chlorid solution when used.

A Local Anæsthetic Tablet.

DR. HERMAN PRINZ.

℞ Novocain . . . . . gr. 1/3
Adrenalin chlorid . gr. 1/1500
Sodium chlorid . . gr. 1/8

SIGNA.—One tablet dissolved in 15 minims of sterile water makes a two per cent. solution of Novocain for immediate use.

NUX VOMICA.

Source.—The seed of the *Strychnos nux vomica*, which contains two alkaloids, *strychnine* and *brucine*, the amount of strychnine being one-fourth to one-half per cent., and of brucine from one-eighth to one per cent.

STRYCHNINE.—*Strychnina* ($C_{21}H_{22}N_2O_2$)—is a white or grayish-white powder of a very bitter taste, almost insoluble in water, and very soluble in boiling alcohol.

SULPHATE OF STRYCHNINE—*Strychninæ Sulphas*—is a white salt in the form of colorless prismatic crystals, which are very bitter and odorless, soluble in ten parts of water, somewhat so in alcohol, but insoluble in ether.

Medical Properties and Therapeutic Uses.—Nux vomica and strychnine are bitter stomachic and muscular tonics. In small doses strychnine increases the gastro-intestinal secretions, hastens intestinal movements, and elevates arterial tension. In larger doses the pupils are dilated and the muscles spasmodically contracted. Poisonous doses cause muscular tremors, intermittent tetanic spasms, and death from rigidity of the respiratory muscles, without any impairment of the mind.

Poisonous quantities of strychnine accumulate in the system, on account of the agent being slowly excreted, from very small doses frequently administered. The antidotes are free evacuation of the stomach, vegetable astringents to precipitate the strychnine, and the inhalation of ether or chloroform, and the hypodermic injection of chloral. Strychnine is employed in anemia, atonic dyspepsia, constipation, vomiting of pregnancy, gastralgia, gastric catarrh, etc., of drunkards, chlorosis, purpura, hemorrhagic diathesis, local paralysis, poisoning by lead, spasmodic asthma, etc., etc. Nux vomica is an antidote to chloral, and is used in intermittent fever as an adjunct to quinine. Brucine is much weaker than strychnine, but similar in its action, and the pure agent is analogous to cocaine, possessing local anæsthetic properties. For hypodermic injection it is resorted to in paraplegia, infantile paralysis, facial paralysis, etc., and also in diseases of the eye, and infraorbital paralysis. A half grain of strychnine has produced a fatal result, and one-twelfth of a grain will produce muscular twitchings, and one-sixteenth of a grain has proved fatal in the case of a child.

Dose.—Of *Abstractum nucis vomicæ*, gr. 1/2; of *Extractum nucis vomicæ*, gr. 1/8 to gr. 1/2; of *Extractum nucis vomicæ fluidum*, ♏j to v; of *Tinctura nucis vomicæ*, ♏v to x; of *Strychnina*, gr. 1/60 to 1/20; of *Strychninæ Sulphas*, gr. 1/60 to 1/10 (0.001–0.006 gm.); of *Brucine*, gr. 1/2 to gr. 1 The dose for hypodermic injection of strychnine should not exceed 1/30 of a grain.

DENTAL FORMULA.

For Neuralgia.

℞ Ext. nucis vom. . . . . gr.v
Zinci valerian . . . . . ℈ij
Ext. gentianæ . . . . . ℈j.
Fiat pill No. XX.

SIGNA.—One pill 3 or 4 times a day.

OLEATES.

Oleates are much cleaner, more efficient and more elegant than ordinary ointments, which are merely mechanical mixtures of fat with whatever remedial agent is employed, and are uncertain in their action, much of the insoluble remedy remaining on the surface of the skin after the fat has been absorbed. The oleates, on the contrary, are chemical combinations of the metal or the alkaloid with oleic acid. They penetrate the skin more readily, every molecule of the oleate being absorbed, carrying with it its definite proportion of the alkaloid or other active ingredient used, thus affectually reaching even deep-seated parts. Since the introduction of oleate of mercury by Dr. John Marshall in 1872, the use of oleates has greatly increased. Dr. Lawrence Wolff has found that a good and ready method of preparing oleates is by the double decomposition of sodium oleates with solutions of neutral salts. The sodium oleate is made by the saponification of oleic acid with sodium hydrate. Dr. Squibb, however, is of the opinion, that in the preparation of oleates, none are so good as those made by the direct union of the acid with the dry base, without heating, and that the preparation should always be either a liquid or semi-solid which is easily and completely liquefied by the natural temperature of the surface to which it is applied; and he further says that in the rare cases where the excess of acid as a solvent of the oleates proves an

irritant to the skin, dilution with a bland oil becomes admissible. The most common oleates in use are those of mercury, zinc, lead, copper, aluminum, bismuth, iron, arsenic, silver, aconite, atropine, morphine, veratria and strychnine. Oleates of the more active alkaloids, namely, aconitia, atropia, strychnia and veratria, are usually made of the strength of two per cent. of the alkaloid; the oleate of morphia usually contains five per cent. of the alkaloid; the oleate of quinine usually contains twenty per cent. of the alkaloid. Dr. Squibb says that all of these are very simply and easily made by putting the weighed quantity of the alkaloid into a mortar, adding a small quantity of the oleic acid, little by little, and triturating until the alkaloid is completely dissolved. The strong solution thus made is then poured into a tared bottle, and the mortar and pestle rinsed, and also the bottle with small quantities of oleic acid. The proper weight is then made up by the addition of oleic acid.

According to the preparation of oleates as recommended by Dr. Shoemaker—

Oleate of Mercury is prepared by precipitating a solution of sodium oleate with mercuric chloride, and is the best local stimulant and alterative application of all the mercurials. It may be diluted with either the paraffinates, or, better still, with lard or lard oils. When applied to the unbroken skin it causes marked stimulation, bordering on congestion. It has great penetrating power, is readily absorbed by the skin, and does not become rancid nor stain the linen. It is a valuable remedy in syphilis, the treatment of indurations after abscesses, skin diseases of a scaly nature, obstinate ulcers, parasitic affections, etc., and may be employed advantageously with other oleates. As it is capable of producing the constitutional effects, it must be employed carefully.

A mixture of oleate of mercury gr. x to xx, with the ointment of oleate of zinc ℥j, is very effective in chronic acne and eczema, especially in the fissured variety of the latter common to the palmar and plantar surfaces. For syphilitic skin eruptions and in superficial ulcers, oleate of mercury ℥j, with oleate of bismuth ℥iij, or the same quantity of the ointment of the oleate of lead, acts promptly and efficiently. For one of the best and most efficacious oily applications for loss of hair, especially when

the scalp is harsh and dry, and the hairs dull and without lustre, a preparation composed of oleate of mercury ℥j to ij, with oil of ergot ℥j, is highly recommended.

Oleate of Zinc is prepared by decomposing a sodium oleate with a saturated solution of zinc sulphate, boiling out and drying the precipitate and then reducing it to an impalpable powder. One part of oleate of zinc melted with three parts of lard or oil gives a most useful ointment, but the best results are obtained from the oleate of zinc alone. It is in the form of a fine, pearl-colored powder, having a soft, soapy feel, much like powdered French chalk. It is valuable in all forms of sweating.

Oleate of Lead is prepared by precipitating a sodium oleate with a solution of lead subacetate. To form the ointment of lead oleate, the washed and dried precipitate is melted with equal parts of lard. Oleate of lead exerts a combined sedative and astringent action when applied to denuded skin, and also arrests morbid discharges, protects the surface and allays irritation. It is useful in eczema, acne and other skin diseases. For skin diseases, oleate of lead ℥ij, with oleate of bismuth ℥j, is very effectual, especially in the fissured form of palmar and plantar eczema; and when the cracking is very deep, to cause stimulation oil of cade gtt. xx to xxx may be added. In scabies oleate of lead ℥iv with sulphur ℥ss is an excellent application.

Oleate of Aluminum is prepared by decomposing sodium oleate with aluminum sulphate. The washed precipitate, mixed with equal parts of lard, forms an ointment of a semi-solid, dark-brown color, which is very astringent in its action. It rapidly arrests all muco-purulent discharges, and is an efficient dressing for foul ulcers, sinuses, burns and scabs.

Oleate of Bismuth is prepared by first obtaining crystallized bismuth nitrate, and dissolving it in glycerine and decomposing with this the sodium oleate. It is of the consistence of ointment, and of a pearly-gray color and a soft, bland substance. It has an emollient and somewhat astringent action, and is an excellent application for relieving cutaneous irritation. In pustular eruptions, especially sycosis, it is a useful application; also in superficial erysipelas, sunburn and chronic inflammation of a portion of the face.

Oleate of Copper is prepared in a similar way to the oleate of

lead, by double decomposition with a saturated solution of copper sulphate. A ten or twenty per cent. ointment can be made with either cosmoline, fat or lard. When applied to the unbroken skin, it penetrates deeply, and causes a slight stimulation; and when applied to broken skin, it coats it with an insoluble albuminate. It is very efficient for ringworm, and in the most obstinate cases usually effects a cure. It is also used with advantage on indolent ulcerated surfaces, and with effect on hard, horny warts and corns.

Oleate of Arsenic is obtained from arsenious chloride, made by the careful saturation by hydrochloric acid with arsenic. This solution is mixed with sodium oleate, when the arsenic oleate is precipitated. In the proportion of gr. xx to an ounce of fatty base, it forms oleate of arsenic ointment, which is soft and yellow, having no action on the skin. When applied to wounds, or ulcerating surfaces, it destroys the tissue to some depth. It is used in lupus, the ulcerating variety of epithelioma, and, after scraping the surface, to destroy warts, corns, old granulations, etc. It may be combined with arnica, opium, belladonna or hyoscyamus.

A number of other oleates are in use, among them *Nickel oleate*, which is a greenish, waxy mass, used in the form of an ointment, containing from five to fifteen grains to the ounce of lard, is astringent and somewhat escharotic, and useful for hard, horny, granulating surfaces; *Silver oleate*, a brownish, pulverent substance, and, in the form of ointment, valuable for application to ulcers, erysipelas, etc.; *Cadmium oleate*, a yellowish-white mass, and in the form of ointment (five to fifteen grains to the ounce), has an astringent and escharotic action, and is useful in glandular enlargements and thickening of the integument.

OLEUM AMYGDALÆ DULCIS—OIL OF SWEET ALMONDS.

Derivation.—The Oil of Sweet Almonds is obtained by first depriving the almonds of the brown powder adhering to their surface, and rubbing them together in a piece of coarse linen, then grinding in a mill or mortar, and then submitting them to pressure in canvas sacks between slightly heated plates of iron. The

oil, which is at first turbid, is clarified by rest and filtration. It is clear, colorless, or of a slight greenish-yellow tinge, nearly inodorous, with a bland, sweetish taste. It will remain liquid at temperatures below the freezing point of water.

Medical Properties and Action.—The oil of sweet almonds is demulcent.

Therapeutic Uses.—It is employed as an emulsion in pulmonary affections with cough, and as a vehicle for other medicines.

Dental Uses.—The oil of sweet almonds forms a pleasant and soothing application for excoriations of the lips and inflamed mucous membranes; also for soothing application to the small, simple, but painful ulcers which sometimes appear upon the gums, mucous membrane of the cheeks, and the tongue. Almond mixture—*Mistura Amygdalæ*—is made by dissolving a mixture of half an ounce of blanched sweet almonds, 30 grains of gum Arabic and 120 grains of sugar, in half a pint of distilled water. It forms a pleasant demulcent.

OLEUM CAJUPUTI—OIL OF CAJUPUT.

Source.—The volatile oil of the leaves of melaleuca cajuputi, a tree indigenous in Batavia and Singapore. It is transparent, of a green color, with an odor like camphor, and a warm, pungent taste.

Medical Properties and Action.—Cajuput oil is a diffusible stimulant, antispasmodic and diaphoretic. Internally administered it causes a sensation of warmth in the stomach, and excites the action of the heart and arteries, afterward producing copious diaphoresis. Externally, either alone or in combination with equal parts of soap liniment or olive oil, it is an efficient rubefacient and stimulant embrocation; it is soluble in one part of alcohol. Its use is becoming more common.

Therapeutic Uses.—It is employed internally as an antispasmodic stimulant in typhus and other low fevers, spasmodic cholera, gout and rheumatism, neuralgic affections, hysteria, flatulence and flatulent colic, headache, nausea, etc. Externally, in neuralgia, headache, gout, rheumatism, lumbago, sprains, contusions, paralysis, etc., etc.

Dose.—Of cajuput oil, gtt. j to gtt. v, in emulsion, or on sugar.

Dental Uses.—Cajuput oil is an efficacious remedy for the relief of odontalgia, applied on lint or cotton to the carious cavity of the tooth; also in neuralgic affections, if they are not connected with inflammatory action. It is non-irritating to soft tissues, and it is to a certain extent germicidal. It is employed in the treatment of pulpless teeth. It is also employed to moisten the inner walls of root-canals previous to filling them with gutta percha, as it is a solvent of that substance, and causes it to adhere to the walls.

OLEUM CARYOPHYLLI—OIL OF CLOVES.

Source.—Oil of cloves is obtained from the dried flower buds of the caryophyllus aromaticus, an evergreen tree, of the natural order Myrtacea—myrtle order—a native of the Indies. The unexpanded buds are of a dark-brown color, with a yellowish red tint.

The oil is prepared by distilling cloves with water, to which common salt is added, in order to raise the temperature to the boiling point. It has a fragrant odor, and a hot, acrid taste; it is soluble in one part of alcohol.

Medical Properties and Action.—Oil of cloves contains tannic acid, a pungent, volatile oil, resin, etc., and two substances—a hydro-carbon, *caryophyllin*, and an oxygenated oil, *eugenol*, called an acid on account of its possessing acid properties. Oil of cloves is an aromatic and powerful stimulant. Although it is a very fluid, clear and colorless preparation when fresh, it becomes yellow by exposure, and ultimately reddish-brown, with the odor of cloves, and a hot, aromatic taste. Like cloves, the oil acts less upon the system at large than on the part to which it is immediately applied.

Therapeutic Uses.—Oil of cloves is sometimes administered to relieve nausea and vomiting, to correct flatulence and excite digestion when languid: but its chief use is to modify the action of other medicines.

Dose.—Of oil of cloves, gtt. ij to gtt. vj.

Dental Uses.—In dental practice, oil of cloves is employed to relieve odontalgia, in the form of a drop or two upon cotton, introduced into the carious cavity of a tooth; it obtunds the

pain by an over-stimulating effect upon the irritable pulp. It is also employed for the same purpose in combination with other agents, such as morphia, sweet spirits of nitre, etc. When the use of creasote or carbolic acid is prohibited, owing to the patient's idiosyncrasy, the oil of cloves may be substituted.

The oil of cloves has also the effect of rendering creasote and carbolic acid more pleasant, without interfering with their action, being added in equal admixture. It is also employed very satisfactorily in the treatment of alveolar abscess, putrid pulps, being applied like creasote or carbolic acid, or combined with other agents.

Eugenol, $C_{10}H_{12}O_2$, also called eugenic acid, is an active principle of oil of cloves and is prepared by decomposing eugenate of potassium with sulphuric acid. It is in the form of a colorless oil, of the specific gravity of 1.076. Its odor resembles that of oil of cloves, and has a sharp, penetrating taste. It does not decompose at ordinary temperatures, and is not affected by exposure to the air. It is soluble in water and alcohol, but the aqueous solution is the more potent as a germicide. It is not poisonous, and when pure will coagulate albumen. For dental uses eugenol is of considerable value. When applied to exposed or partially exposed pulps of teeth it usually relieves the pain in from one to two minutes. For inflamed and congested pulps, it has been suggested to first apply a solution of borax and then eugenol. It also answers well as a dressing for root-canals, especially after the removal of a recently devitalized pulp. In alveolar pyorrhœa, it is used in solution, 1 part of eugenol to 1000 of water, for the purpose of cleansing the pus pockets. In alveolar abscesses it has been suggested as an injection, after the use of peroxide of hydrogen, taking the precaution, in cases of abscesses with a fistulous tract, to seal the root at the apex. It has also been successfully employed in the treatment of benign tumors of the mouth, in the form of an injection of two drops.

OLEUM MORRHUÆ—COD-LIVER OIL.

Source.—Cod-liver oil is obtained from the liver of the cod, *Gadus morrhuæ*, and is in the form of a fixed oil, containing biliary principle, traces of iodine, bromine, phosphorus, lime, magnesia, iron, soda and sulphuric and phosphoric acids; also a

principle known as *gadin*. By distillation with ammonia, it yields *propylamin*. The pale oil is considered to be the best for internal use, and is the officinal preparation. Iodine, phosphorus bromine and iron are often combined with cod-liver oil, but are considered to add nothing to its therapeutical powers. The special medicinal value of this oil depends upon the gaduin and propylamin, which are constituents of bile, iodine, phosphorus, bromine, etc., as well as upon the common ingredients of animal fat. The phosphates, hypo-phosphites, or the lacto-phosphate of lime are often combined with cod-liver oil, with excellent effects.

Medical Properties and Therapeutic Uses.—Cod-liver oil is considered to be a valuable remedy in certain forms of phthisis, such as the chronic forms—chronic tuberculosis and fibroid lung; but not in acute phthisis and caseous pneumonia; also in chronic affections of the brain and nervous system, and such skin diseases as lupus, ecthyma, psoriasis, etc. It is also employed in sequelæ of scarlet fever, chronic bronchitis, emphysema, chronic rheumatism and rheumatic arthritis, strumous synovitis, scrofula, caries and necrosis of bone; scrofulous, rickety infants and chlorotic girls derive benefit from warm baths and inunctions of the oil; also lean persons. Inunction with cod-liver oil is also useful in rubeola, scarlatina, erysipelas, high fevers, catarrhal attacks, scrofula, phthisis, chronic dysentery, etc. It builds up the tissues, repairs waste and supplies nervous, muscular and digestive power. It may be administered in ale, beer, coffee, lemon juice, hot whiskey punch, compound spirits of lavender and brandy, or washing out the mouth with whiskey or brandy, or as an emulsion made with glycerine and yolks of eggs, and flavored. It is also used in the preparation of bread in form of rolls; ether added to it promotes its digestion; fifteen minims of ether to every half-ounce of the oil.

Dose.—Of cod-liver oil, f℥j to ℥iv.

The emulsion contains about 50 per cent. of the oil, and is more pleasant to take.

OPIUM.

Source.—Opium is obtained from the unripe capsules of the papaver somniferum, of the natural order *Papaveraceæ*—poppy

order, in the form of a concrete juice, which exudes from incisions, and which is permitted to evaporate spontaneously. Commercial opium is in the form of irregular masses, of from a few ounces to several pounds in weight, with a moist, brown or chestnut surface, and a peculiar odor and nauseous taste. The purest form should have a chestnut color, a strong aromatic flavor, and a dense consistence, and break with a deeply notched fracture, and when drawn across white paper leave an uninterrupted line. The chief alkaloids of opium are morphine and codeine. The alkaloid morphine is the most important of the chemical constituents of opium. (See Morphine.)

Medical Properties and Uses.—As an anodyne and hypnotic opium possesses the power of relieving pain and inducing sleep; it relaxes muscular spasm, and hence is a very efficient remedy in tetanus, spasms, nervous irritability and discharges of a morbid nature. It excites the circulation as a first action, and increases the temperature of the skin, and causes an agreeable exhilaration of the intellectual faculties, so much so as to be used by some as an habitual narcotic, which is finally destructive to both the physical and mental functions. But the stage of excitement is very transient, and is succeeded by a falling of the pulse, a diminished susceptibility to external impressions, confusion of mind and the loss of consciousness in deep sleep. Other effects are also manifested, such as dryness of the throat, thirst, and in some cases, nausea and vomiting, with an itching miliary eruption on the skin; its action is chiefly upon the brain and medulla.

Taken in large or poisonous doses, opium does not cause any excitement, but giddiness and stupor rapidly supervene, with a lessening in the frequency of the pulse, but not in fulness, a tendency to sleep, which is irresistible, and finally coma, in which the breathing is very heavy and stertorous, the pulse slow, and the pupils contracted, with a sinking of the pulse and relaxation of the muscles immediately preceding death; in the case of children death is often preceded by violent convulsions. It should be administered with caution, and its habitual use be guarded against; it should not be given to children.

The antidotes in poisoning by opium are the stomach pump, emetics in double doses, such as sulphate of zinc, in doses of gr.

xx to gr. xxx, or sulphate of copper, gr. v to x; also mustard in powder, ʒss, or powdered alum, answer as emetics, strong coffee, keeping the patient in motion, counter-irritation to nape of neck, flagellation to the palms of the hands and soles of the feet, and the electro-magnetic battery, which is often efficient when other measures fail, artificial respiration, and belladonna, in hypodermic injections of its alkaloid atropine, in solution. No local lesions are found after death.

Therapeutic Uses.—Opium as an anodyne and hypnotic is employed in almost all diseases where the necessity of assuaging pain and inducing sleep is required. (See Morphine.) Opium is contra-indicated where there is a tendency to apoplexy or coma, or where an unusual susceptibility to its influence exists, and it should be administered to the very young and very old with great caution. When long administered it is necessary to increase the dose Externally, in the form of powder, it is applied to irritable ulcers, etc., and to the rectum, as suppositories.

Dose.—Of opium, in powder or pill, as an anodyne and hypnotic, gr. j.

Dental Uses.—Opium is employed as an anodyne in convulsions of teething, but must be administered with great care and in small doses; also as an anodyne preparatory to lancing the gums of children; also in mercurial salivation, to arrest the excessive secretion, in doses of gr. j every four hours; also in neuralgia; but it is inferior to aconite. A small lump of opium in contact with an aching tooth pulp will relieve the pain, or the powder may be used for the same purpose. In the form of wine and tincture, opium is serviceable in odontalgia, periodontitis, inflamed gums and mucous membrane of the mouth; in injections, for alveolar abscess, when it is often used in combination with tincture of iodine. The wine of opium is a more soothing and pleasant application than the tincture of opium.

Vinum Opii—*Wine of Opium*—is obtained by macerating two ounces of powdered opium, together with cinnamon and cloves, in one pint of white wine. *Dose.* ♏v to ʒj.

Dental Uses.—Employed as a soothing and anodyne application to inflamed and tender gums and mucous membrane, odontalgia, ulcerations of mouth, alveolar abscess, periodontitis, pulpitis, etc. Dr. W. H. Atkinson recommended wine of opium

by means of injection, into pockets and cavities, where such exist, in cases of aching gums or teeth.

DOVER'S POWDER—*Pulvis ipecacuanhæ et opii. Dose*, gr. x. Ten grains contain one grain each of ipecac and of opium, and eight grains of sugar of milk. For influenza or "common cold," a dose of Dover's powder taken at bedtime, with such adjuncts as warm clothing, hot drinks, foot-baths, etc., to promote profuse diaphoresis, proves very effective. Ten grains at bedtime is also a very serviceable remedy for inflammations of the peridental membrane.

TINCTURA OPII—*Tincture of Opium*—laudanum is composed of powdered opium, ℥iiss; diluted alcohol, Oj. Dose, ♏v to ♏xxx; 25 drops are equivalent to one grain of opium. Its strength increases with age. Tincture of opium in hot water (f℥ij, to aquæ ferv. f℥x), held for some minutes in the mouth, is useful in peridental inflammation.

One drachm of the tincture contains 120 drops. The dental uses are the same as for wine of opium, but the latter is the most pleasant application for the mouth.

TINCTURA OPII CAMPHORATA—*Camphorated Tincture of Opium*—paregoric elixir—is prepared by macerating sixty grains of opium in two pints of diluted alcohol, with sixty grains of benzoic acid, a fluidrachm of oil of anise, two ounces of clarified honey, and forty grains of camphor. Paregoric contains 0.4 per cent. of opium. *Dose*, f℥j to f℥j or a tablespoonful, containing a little less than one grain of opium. Dose for an infant, gtt. v to xx. This is an agreeable preparation, and is used for children.

TINCTURA OPII DEODORATA—*Deodorized Tincture of Opium*—is composed of the watery extract of opium, washed with ether, which is afterward separated, and the residue dissolved in water and mixed with enough alcohol to preserve it. This preparation of opium is free from the narcotina and many other injurious ingredients of opium, and is a valuable preparation. *Dose*, ♏v to ♏xxx.

CODEINE is one of the alkaloids of opium, and is less powerful and depressing in its effects than morphine, and its after effects are not so unpleasant. Dose, gr. 1/4–2.

HEROINE is a crystalline anodine and sedative derived from

morphine ($C_{17}H_{17}$.—O.O.C.$CH_3)_2$. N.O. Heroine has a more depressant effect upon the respiratory centre than morphine or codeine. Dose, gr. 1/12 to 1/6.

DENTAL FORMULÆ.

A Stimulating Injection for Abscess of Antrum.

J. S. SMITH.

℞ Glycerinæ . . . . . f℥j
Tinct. opii camph. . . f℥ij
Eau de cologne . . ℥iv. M.
SIGNA—Inject daily.

For Infantile Diarrhœa During Dentition.

When there is a tendency to an acid fermentation of the food.

DR. JAS. W. WHITE.

First give a grain of bicarbonate of sodium, or of potassium with anise, cinnamon, or caraway, with each meal. If undigested food or vitiated secretions in alimentary tract are suspected, a dose of castor oil and aromatic syrup of rhubarb in equal portions—dose, a teaspoonful; if torpidity of liver, a few doses at intervals of two hours, of the twelfth or sixteenth of a grain of calomel with one or two grains of sodium bicarbonate. If the diarrhœa persists, use the following, first prohibiting the use of farinaceous or milk food.

℞ Tinct. opii . . . . . gtt.viij
Bismuth. subnitrat. . ℥j
Mucilag. acaciæ . . f℥ss
Aquæ menth. pip. . . f℥ss. M.
SIGNA.—A teaspoonful every 3 hours to a child 6 months old. Opium is indicated only after all offending matters have been expelled from the alimentary canal.

For Infantile Diarrhœa During Dentition.

If it is due to relaxation from long-continued warm weather, or following cholera infantum, and no fever is present.

DR. JAS. W. WHITE.

℞ Tinct. opii camph. . f℥j
Ext. hæmatoxyli . . gr.xvj
Mist. cretæ,
Aquæ cinnamoni. . āā f℥j. M.
SIGNA.—A teaspoonful in water every 4 hours for a child 6 months old.

ORTHOFORM—METHYL-PARA-AMIDO-METE-OXY-BENZOATE.

Formula.—$C_6H_3(OH)$ $(NH_2)COOCH_3$.

Orthoform occurs in the form of a white, voluminous powder, odorless, and tasteless, and slightly soluble in water, and freely in alcohol.

Therapeutic Action.—Orthoform is antiseptic, hemostatic, and a local anæsthetic. It is used as a local anæsthetic and antiseptic to relieve the pain of ulcers, burns, wounds, excoriations, etc. As it is non-toxic it may be applied to large surfaces *ad libitum*.

In the form of ointment it is employed to the extent of 10 to 20 per cent. made up with lanolin. It is also administered internally in affections of the gastric mucous membrane. Combined with hydrochloric acid—"orthoform hydrochloride"—in the form of a soluble crystalline salt, anæsthetizes as well as the powdered orthoform, but is not applicable for subcutaneous injection.

Dose.—Of Orthoform, gr. viii to xv.

Dental Uses.—Orthoform is applied to ulcers, excoriations, etc., as an antiseptic, and anæsthetic. It is also recommended for hemorrhage following the extraction of teeth; after removing the blood, the alveolar cavity is packed with the powdered orthoform to arrest the hemorrhage. Although orthoform is inferior to cocaine as a local anesthætic, and especially so on account of being but slightly soluble in water, yet it is a valuable analgesic when topically applied to ulcerated surfaces, burns, etc.; as it is non-toxic and can be applied to abrasions of the mouth with benefit. It may be dissolved in collodion and is soluble in equal parts of alcohol and water, but is generally used in the form of powder.

A new form of Orthoform (under the name of Orthonew) has been introduced, this new preparation being whiter and cheaper than the original orthoform. This new preparation is perfectly non-irritating, even when applied in its full strength, and is used in the same way as the original.

OXYQUINASEPTOL—DIAPHTHERIN.

Formula.—$HO—C_9H_6NH—O—SO_2—C_6H_4—O—NHC_9H_6—OH$.

Derivation.—Oxyquinaseptol is a union of two molecules of oxyquinolin and one molecule of asceptol, *i.e.*, phenolsulfonic acid.

Medical Properties and Uses.—Oxyquinaseptol is an energetic antiseptic, having little or no caustic action. Three per cent. solutions possess anti-bacterial properties, and one per cent. solutions are sufficient for the treatment of wounds, as it is the least poisonous of antiseptics. It is preferred by Kronacher and Brandt to carbolic acid or sublimate on account of its extreme antiseptic properties in small concentrations, and because of its insignificant toxic effects. It is prescribed in powder or pill form, and in thirty to fifty per cent. solutions.

Oxyquinaseptol, in the non-precipitated form, is of a yellowish sulphur color, with a slight phenol odor, while the precipitate is white.

Dental Uses.—As an antiseptic in all affections requiring antisepsis, such as putrescent pulps, abscess, fistulous openings, suppuration from necrosis of maxillary bones. Dr. Brandt, of Berlin, asserts that at the present time no antiseptic material exists which is more valuable for like cases than diaphtherin.

PAPAIN OR PAPAIVA—PAPAYATIN.

Source.—Papain is a ferment obtained from the *Caricapapaya*, from which exudes, on incision, a white, slightly astringent and milky juice, which contains the papain. It has the taste of pepsin and is soluble in water and glycerol.

Medical Properties and Action.—Papain is a digestive ferment like pepsin, its active digestive power causing the solution of albuminous substances. Catillon denies that it is a true ferment, with power to convert albuminoids into peptones; hence it cannot be substituted for pepsin in affections of the stomach; it is active in an acid, neutral or faintly alkaline solution.

Therapeutic Uses.—It is an active solvent of false membranes, intestinal worms, ascarides and tænias, hence it is employed in diphtheria, ascarides, vermiculares, tapeworm. Locally, like pepsin, it is employed in the form of injections made with a hypodermic syringe, in the treatment of fatty tumors and other benign growths, and to retard the growth of cancerous and other malignant tumors, the solution being injected well into the substance of the tumor.

Dental Uses.—Papain is employed in the treatment of ulcers and tumors of the mouth, both benign and malignant, the solution being injected into the substance of the growth by means of a hypodermic syringe; it has also been used to digest portions of a pulp, requiring from 24 to 72 hours, the cavity well secured. Dr. Harlan states that if one gram of papain is made into a thick paste with glycerol and a drop of hydrochloric acid solution (1–300), is added, it always acts well in pulp-digestion, prior to the removal from the roots of teeth of dead pulp-tissue.

PEPSINUM—PEPSIN.

Source.—Pepsin is obtained by digesting the mucous membrane of the stomach of the pig, calf or sheep, which has been scraped off, chopped finely, and macerated for several days in water, in a solution of muriatic acid, from which the pepsin is precipitated with chloride of sodium. The medicinal preparation is in the form of a nitrogenized, light, amorphous, grayish-white or fawn-colored powder, soluble in water and alcohol, and of a peculiar odor, and bitter, nauseous taste. When quite pure, it is both tasteless and inodorous. When decomposed by heat it no longer possesses digestive properties, and much of what is sold is almost or wholly inert. Pure pepsin is an artificial digestive.

Medical Properties and Action.—Pepsin is an essential constituent of the gastric juice, and digests the nitrogenous constituents of the food, converting them into peptones. Taken internally, as a medicinal preparation, pepsin increases the appetite and allays irratability of the stomach. It should be administered immediately before meals, and no hot food taken for some time afterward.

Therapeutic Uses.—Pepsin is employed in dyspepsia, gastralgia, obstinate vomiting, infantile diarrhœa, apepsia of infants, vomiting of pregnancy, cancer and chronic ulcer of the stomach, anemia, chlorosis, atrophy, etc. Externally it is injected into cancerous tumors and morbid growths with the hypodermic syringe, to retard their progress.

Dose.—Of pepsin suspended in syrup, saccharated pepsin—*Pepsinum saccharatum* gr. v to gr. x. Syrup of orange peel will disguise its odor. *Vinum Pepsini.* Dose, ℥ss to ℥j. *Glycerinum Pepsini.* Dose, ℥ss to ℥j.

Both the saccharated pepsin and the glycerole are unchangeable.

Pepsin appears to be especially efficient in cases of children; and when pepsin and a small quantity of hydrochloric acid are added to animal broths given by the rectum, in cases where food is rejected by the stomach, such nourishment is very beneficial.

Dental Uses.—In dental practice, pepsin is successfully employed in the treatment of putrid pulps of teeth, as an antiseptic and deodorizer. In the form of a thin paste made by mixing

pepsin with water containing some two per cent. of hydrochloric acid, it is introduced into the pulp canal after the removal of the decomposed matter, and confined by a temporary filling in the crown cavity, being permitted to remain for twenty-four hours, when it is removed and the canal syringed with tepid water, and if necessary, the application of the pepsin paste repeated until the odor of decomposition can no longer be detected. Pepsin, in the form of the paste, is also applied to partially decomposed dentine, which may, for good reasons, be permitted to remain immediately over the pulp of the tooth, the action of the pepsin being confined to dead matter alone. The hydrochloric acid and pepsin paste has also been recommended for devitalizing the pulps of teeth where rapid action is not desired, the quantity employed being about one-fifteenth of a grain.

DENTAL FORMULÆ.

For Suppurating Dental Pulps.

OAKLEY COLES.

℞ Acidi hydrochlorici . ♏j
Aquæ destillatæ . . . ♏xl
Pepsin porci . . . . q.s.

SIGNA.—To be applied to suppurating pulps.

For Indigestion.

MIALHE.

℞ Pepsini . . . . . ℥iss
Aquæ . . . . . f℥viss
Vini xerici . . . . . f℥xiiss
Alcoholis . . . . . f℥iij
Sacchari . . . . . ℥j

SIGNA.—A tablespoonful immediately after each meal.

INGLUVIN is a ferment prepared from the gizzard of the chicken, and its effects are analogous to those of pepsin It is employed internally for indigestion, etc., and to prevent nausea and vomiting.

Dose.—Of Ingluvin, grs. v to ℈j.

PEROXIDE OF HYDROGEN—HYDROGEN PEROXIDE.

HYDROGEN DIOXIDE.

Formula.—H_2O_2.

Derivation.—Peroxide of hydrogen is obtained by rubbing up peroxide of barium with distilled water, so as to form a liquid paste, which is added gradually, with constant stirring, to distilled water acidulated with one-third of its weight of hydro-

chloric acid, contained in a vessel immersed in a freezing mixture. When the muriatic acid is saturated, a fresh quantity of the acid in a concentrated state is added, and then more of the peroxide of barium, and the operation repeated till the solution will hold no more chloride of barium, which is deposited by a mixture of ice and salt, except a small portion which is gotten rid of by adding sulphate of silver to precipitate the sulphate of baryta and chloride of silver. The filtered liquid is then concentrated by sulphuric acid, and the water rising in vapor is absorbed and protoxide of hydrogen is obtained nearly pure, in the form of a colorless liquid of a fluid consistence.

L. Crismer explains a new and economic process for preparing hydrogen peroxide. It depends upon the long-known property of sulphuric ether of taking up and dissolving large quantities of H_2O_2. Commercial barium oxide, containing from 85 to 90 per cent. of BaO_2 is treated with an excess of hydrochloric acid (1.10 specific gravity), and the solution shaken up with an equal volume of ether. The mixture is let stand until separation has taken place, when the ether is drawn off and agitated with distilled water, which latter removes and takes up all the hydrogen peroxide which the ether held in solution. The cleaned ether is separated from the water, and is again shaken with the solution of barium oxide, and again extracted with the distilled water. The operation is repeated five or six times, by which the extraction of H_2O_2 is complete. The aqueous solution will then form 8 to 9 per cent. of the peroxide, and is entirely neutral and free from solid matter.

Medical Properties and Physiological Action.—Peroxide of hydrogen "is a powerful and oxidizing agent on account of its unstable nature, as it immediately reacts with and destroys sulphurated hydrogen, and many other compounds susceptible of change. It possesses the advantage, sometimes a very important one, that the product of its composition (water) is neutral and destitute of chemical activity, while hydrogen peroxide itself has not the extreme tendency to act on inert organic matter which so much diminishes the practical value of the permanganates. On the other hand, hydrogen peroxide possesses true disinfectant properties of a marked character." Fibrin and cellular tissue cause it to evolve oxygen, while albumen, gelatin,

urea, and cutaneous tissue have no effect upon it; it is also styptic and disinfectant.

Topically, it acts by imparting oxygen to the diseased tissues, and thus destroying them. Bert and Reynard found that soluble ferments do not seem to be affected by it; saliva, diastase, the gastric and pancreatic fluids, continue to act in solutions containing peroxide of hydrogen. The conclusions, therefore, that these, as well as Péau and Baldy, have arrived at are that peroxide of hydrogen, even when very dilute, arrests fermentation due to the development of living organisms, and the putrefaction of all substances which do not decompose it; that containing, according to circumstances, from two to six times its volume of oxygen, it is capable of advantageously replacing alcohol and carbolic acid; that it can be employed externally for dressing wounds and ulcerations of all natures, in injections and in vaporizations, and internally; that the results obtained in the case of the largest operations, up to the present, are in the highest degree satisfactory; that not only fresh wounds, but old ones, proceed rapidly to cicatrization, and reunion by first intention appears to be encouraged by its use as a dressing; that the general as well as the local state appears to be favorably influenced; that the advantage over carbolized water are its not having any poisonous effect nor unpleasant odor, while its application is entirely painless. It is an effective application in a large class of diseases in which mucous membrane tissue is chiefly affected, and for cleansing purposes is considered to be unequaled. Dr. Prince remarks that a drop of pus will decompose peroxide of hydrogen and liberate nascent oxygen, which adhere to and attacks all the adjacent tissues for which it has an affinity, and it thus becomes a powerful bacterial destroyer. Peroxide of hydrogen for surgical use must be entirely neutral, as that obtained generally often contains sulphuric acid, so that its use would not be without danger; it does not coagulate albumen.

Therapeutic Uses.—Peroxide of hydrogen is employed as an internal remedy in low forms of fevers, chronic and subacute rheumatism, whooping-cough, chronic bronchitis, dyspepsia, as it improves digestion, diabetes, etc., etc. Locally employed, it is an effective antiseptic, disinfectant, and a powerful deodorant owing to its oxidizing properties, destroying very rapidly hydro-

gen, sulphur and similar gases. When it is brought in contact with pus, a rapid change takes place, with evolution of oxygen gas, the pus-corpuscles becoming granular, losing form, and breaking up into detritus. It thoroughly cleanses putrid cavities and abscesses. Owing to its rapid action, however, it cannot take the place of bichloride of mercury, nor has it the germicidal power of this latter agent, although it possesses such properties. As a bactericidal agent, it is very serviceable in microbic affections of the mouth and throat, such as diphtheritic and aphthous stomatitis. It produces little or no irritation when used about tender organs, and can be successfully applied in an unirritating form, so that it comes in contact with and destroys diseased germs; hence its applicability to dental uses, and in ocular and oral therapeutics, as in gonorrhœal ophthalmia and mastoid abscess, for example. Peroxide of hydrogen acts very promptly and beneficially in feeble, flabby or ill-conditioned ulcers, chancre, and diphtheritic sores, ozæna, wounds, both fresh and putrid, etc., etc. Peroxide of hydrogen appears to have no injurious effect upon animal cells, but has a very energetic destructive action upon vegetable cells—microbes. It has no toxic properties, and is also harmless when given by the mouth. It is especially applicable in the treatment of diseases caused by germs if the microbian element is directly accessible, and is particularly useful in the treatment of infectious diseases of the mouth and throat.

To obtain the best results from peroxide of hydrogen, it should be kept in a cool place, tightly stoppered, and when required for use as much as desired should be poured from a large bottle into a small receptacle, and only the quantity to be used at a time be exposed to the light. For injection, a small glass or rubber syringe should be used, as contact with metal destroys its utility.

As a test for peroxide of hydrogen, Dr. Chas. Mayr suggests a paper saturated with a mixed solution of iodide of potassium and dithionate of soda. The peroxide of hydrogen liberates the iodin in the iodide of potash, but this liberated iodine is immediately seized by the dithionate of soda and a colorless solution is the result. But if enough of the peroxide is applied the blue spot will appear, because more iodine is liberated than can be used in

oxidizing the dithionate of soda to tetrathionate of soda; to make the reaction more pronounced still, a little starch-paste is added. By this paper one drop of peroxide of hydrogen of 12 volumes of oxygen, produces a blue spot in 20 seconds; with six volumes in from one to two minutes; and with four volumes no blue spot is produced, only possibly a blue rim.

Dose.—Of peroxide of hydrogen, gr. iij to gr. v, containing six times its volume of oxygen, or two per cent. In operations on mucous membrane, a strong solution of peroxide of hydrogen—twelve per cent.—greatly facilitates by decolorizing the blood and by its cleansing, styptic action.

Dental Uses.—Peroxide of hydrogen is a valuable remedy in dental therapeutics, especially in the treatment of alveolar abscess, alveolar pyorrhœa, ulcerations of oral mucous membrane, gangrene or cancrum oris, fungous growths, bleaching discolored teeth, putrescent pulps, stomatitis, etc., etc.

A twenty per cent. solution has been recommended for the arrest of hemorrhage, after tooth extraction, by Mr. Bennett.

Dr. A. H. Prince's method of treatment, in the case of alveolar abscess, illustrates the properties of peroxide of hydrogen. "The septic abscess is caused to heal by one application made in the following manner: After removing the pulp and passing a broach through a canal of the root into the abscess cavity a drop of the liquid is injected by means of Farrar's syringe. The cavity of the crown is then immediately closed with softened gutta percha, before which, under pressure of the finger, the liquor is driven into the abscess cavity. Upon coming in contact with the pus in the fetid cavity, the liberated gas permeates it throughout, and by the continued evolution of the gas the cavity is emptied of its contents, which boil out at the fistulous opening so thoroughly mixed that the appearance is that of foam or froth; while the remnant thus removed is rendered so thoroughly antiseptic that the healing process proceeds uninterruptedly." Dr. A. W. Harlan has successfully employed the peroxide of hydrogen, in connection with iodide of zinc solution and other agents, in the treatment of alveolar pyorrhœa.

Dr. Harlan's treatment is as follows: First pack the pus pockets with iodoform and eucalyptus, or iodoform and oil of cinnamon, or thoroughly syringe with a one to three grain solution to

the ounce of water of chloride of alumina, a method which will relieve the suffering and reduce the swollen gums to their normal size. In three or four days the sanguinary deposits may be removed, and the edges of the alveolus scraped or chiseled off. The pockets are then syringed with peroxide of hydrogen, and, after drying the gums, injected with one, two or three drops of a solution of iodide of zinc, grs. xii to the ounce of water. On the fourth day the gums are carefully dried, and a fine cone of cotton or bibulous paper moistened with peroxide of hydrogen, gently pressed into each pocket. If any effervescence occurs, it denotes the presence of pus, when each pocket should be again injected with the iodide of zinc solution. In chronic cases, after syringing with the peroxide of hydrogen, a stronger injection of the iodide of zinc (grs. xxiv to the ounce of water) is made, and in very bad or hopeless cases even a stronger solution of the zinc (grs. xlviii to the ounce of water); and when the gingival margins present a ragged border or cone-shaped slit, pure granular iodide of zinc is applied to such edges. The injections into the pocket is repeated every fourth day. In some cases constitutional treatment is also required. Peroxide of hydrogen has also been successfully used for bleaching discolored teeth, first adjusting the rubber dam and repeatedly washing out the cavity with the peroxide of hydrogen, and then carefully drying with the hot-blast syringe. A small quantity of chloride of alumina is then placed in the cavity and moistened with peroxide of hydrogen and allowed to remain for five minutes, and then washed out with a clear solution of sodæ biboras. A 25 per cent. ethereal solution of hydrogen peroxide is caustic and employed for disinfecting root canals. (*See Pyrozone.*)

DENTAL FORMULÆ.

Antiseptic and Stimulant Mouth-wash For use in Alveolar Pyorrhœa, etc., etc.

DR. CHAS. B. ATKINSON.

℞ Hydrogen perox. . . ℥iv
Tinct. calendulæ . . ℥ij. M.

SIGNA.—Use daily.

For Alveolar Pyorrhœa.

DR. A. W. HARLAN.

℞ Hydrogen perox. . ℥j
Hydrarg. bichlor. . gr. 1/2. M.

SIGNA.—Inject into pockets until they are free of all foreign matter.

PEROXIDE OF SODIUM—SODIUM PEROXIDE—SODIUM DI-OXIDE.

Formula.—Na_2O_2.

Derivation.—Sodium Peroxide was introduced by Dr. Edward C. Kirk in 1893, and is obtained by adding the peroxide of hydrogen to an excess of caustic soda solution of twenty per cent., and then pouring into alcohol. It is the oxide formed when sodium is allowed to burn briskly in dry air or oxygen. Chemically considered, it is the analogue of peroxide of hydrogen; it is caustic, alkaline and soluble in water and valuable as a bleaching agent.

Properties.—It is a strongly alkaline and caustic white solid, or powder, soluble in water, when it produces an increase of temperature and evolves a certain amount of oxygen, with scarcely any loss of the latter if the peroxide of sodium is added to the water in small quantities and gradually stirred in; when the solution is made hurriedly by the addition of large quantities of the powder to the water at a time, the evolution of heat, due to the energy of the combination, causes rapid elevation of the temperature of the solution and the decomposition of the peroxide.

It is necessary to protect this preparation of sodium from moisture, and if exposed to the air its weight increases twenty per cent. in twenty-four hours. The presence of water and contact with organic matter produces inflammation in such matter, hence it is necessary to handle this drug with care.

Peroxide of sodium very closely resembles peroxide of hydrogen in the readiness with which it separates from the extra atom of oxygen it contains, and its bleaching property depends upon this extra atom of oxygen, which, when liberated, seizes upon the hydrogen of the organic color-compound, thus destroying its identity. While peroxide of hydrogen contains but three or four per cent. of available bleaching oxygen, peroxide of sodium contains about twenty per cent., and as a bleaching agent, antiseptic, disinfectant and sterilizer, it has an additional advantage over peroxide of hydrogen, by possessing a saponifying and solvent action upon the oils, fats and animal tissue present in the dentinal structure of the teeth.

On account of its being freely soluble in water, and uniting with it so energetically as to evolve considerable heat, such action can be controlled by adding the powdered peroxide of sodium slowly and in small quantities to the water, which should always be done in making solutions, as decomposition and loss of oxygen result when such care is not taken, and the solution is allowed to become hot. A standard solution can be reduced to any desired strength by adding definite proportions of water. Strong solutions of peroxide of sodium are powerfully caustic and dissolve animal tissue and saponify oils and fats.

Dental Uses.—Peroxide of sodium when carefully employed, has proven highly successful as a bleaching agent for discolored teeth, and a detergent disinfectant and sterilizer in the treatment of putrescent conditions of the pulp chamber and canals, as it penetrates the tubuli and dissolves the fibrils as well as the fatty constituents. Peroxide of hydrogen contains about three or four per cent. of available oxygen, while peroxide of sodium contains twenty per cent., and in addition is a powerful saponifier; hence its superiority as a bleaching agent. A solution varying in strength from full saturation to one containing about five per cent. of the saturated solution, has been employed by Dr. E. C. Kirk in the treatment of pulpless teeth with putrescent canal-contents, and especially in such cases where the whole structure of the dentine was permeated and colored by an offensive and fermenting mass of decomposing organic matter, with often a blind abscess as an accompaniment to add to the foulness present, with satisfactory results. He recommends flooding the pulp-chamber and canals with a fifty per cent., or even a saturated solution, of peroxide of sodium, with the rubber-dam in position to prevent contact of the solution with the soft tissues of the mouth, the activity of the preparation being at once shown by the evolution of gas similar to the action of peroxide of hydrogen, but with less violence and rapidity. Peroxide of sodium is also very effective as a bleaching agent for carious and discolored dentine. For bleaching purposes, Dr. Kirk recommends saturating the dentine with a strong solution of peroxide of sodium (50 per cent.), following this by treatment with a dilute acid, such as hydrochloric, sulphuric or acetic, or a ten per cent. solution of trichloracetic acid; the preference is given to hydrochloric. In

addition to such properties, peroxide of sodium completely sterilizes the dentine by acting as a mechanical cleanser, and a solvent of the organic *débris* and fats, in the form of small shreds of pulp-tissue and organic matter in a partially decomposed state. Dr. Kirk also recommends, after the application of the peroxide of sodium, inserting into the canals, for a moment on cotton, a diluted solution of hydrochloric or sulphuric acid, afterward washing and drying with hot air, and then immediately filling them. For the upper teeth he recommends that the application of the solutions be in pledgets of asbestos fibre, as the cotton is rapidly disintegrated by strong solutions.

Dr. Harold Clark describes his method of preparing a saturated solution of peroxide of sodium as follows:

"I put two ounces of distilled water in a small four ounce lemonade glass and prop it up in a basin of water so that the level of the water in the glass be just below the level of the rim of the basin. I place the latter under the cold water tap so that a small stream may run continuously into the basin about the glass. In this way its contents are prevented from rising in temperature. The violent reaction occurring when peroxide of sodium is put in water, raises the temperature of the water, driving off the oxygen which we desire to retain in the solution. By surrounding the glass with cold water and sifting the peroxide of sodium in small quantities every half hour until the solution becomes semi-opaque we obtain in the course of two or three days a saturated solution."

Dr. L. P. Van Woert suggests the following method of preparing a satisfactory solution of peroxide of sodium: "Take a common tumbler about half full of distilled water, place it in the centre of a good-sized pudding-dish, and pour all the cold water around it possible, without floating the glass. Add the sodium peroxide in very small portions—about what could be taken upon the point of the large blade of a pocket-knife—dusting in the water slowly to cause as little agitation as possible, and this amount should not be added oftener than once in a half hour, being careful to have the sodium peroxide finely powdered. This to be continued until the preparation begins to look opaque as powder is added. Let it stand over night and it is then ready for use. If a lump about the size of a small bean is dropped into

water, you will notice on the margin of the line of agitation a ring of color resembling iodine. If the peroxide is put in the water, as I have suggested, there will be very little surface agitation and none of the discoloration, the result of which is a solution that has never failed. This takes several days to make, but it will more than pay for the time consumed, in its prompt action as a bleacher and sterilizer. I have placed this solution in the hands of a number of gentlemen, to be used in the treatment of abscessed roots, and up to the writing of this not a single failure has been reported. The general impression is that sodium peroxide is for breaching only, while it is the most valuable preparation ever found for the treatment of dead teeth, if used in the following manner: Cleanse the root-canals of such septic matter as possible to get at with instruments, and dry them with hot air; then carry small ropes of cotton, saturated with a full strength solution, as near the foramen as you can, using orange-wood, shaped like fine probes, and cover with a temporary stopping, letting the whole remain for two days, after which wash with hot water, and fill in the usual manner." When peroxide of sodium is introduced into a pulp-canal a chemical reaction takes place, and like peroxide of hydrogen, it is an active oxidizer from the facility with which it parts with one atom of oxygen; it is also a saponifier and solvent of the pulp tissue, and of oils and fats. Its effects on the fibrils are to dissolve and saponify them as a bleaching agent, its action reaching far into the dentinal tubuli.

PHENACETINE—PARAACETPHENITIDINE.

Formula.—$C_{10}H_{13}NO_2 = C_6H_4—(OC_2H_5)NH(C_2H_3O)$.

Medical Properties and Therapeutic Uses.—Phenacetine is slightly soluble in water, but freely soluble in alcohol, and has proven to be a most reliable antineuralgic without deleterious effects. It causes no nausea, vomiting or diarrhœa; no collapse, no cyanosis, or depressing after-effects. It is thought to produce its effects by slowly dissolving in the lactic acid of the stomach. Phenacetine is more powerful than antipyrine, but is considered to be comparatively safe.

Prof. Rumpf considers phenacetine to be not a narcotic, but an antineuralgic acid from its strong antipyretic action.

The mode of action is probably a direct influence on the central nervous system—that of the vaso-motor more especially, for phenacetine acts especially on the vaso-motor neurosis, which indicates a powerful effect on the circulation. Phenacetine is a strong analgesic, and thought to be more powerful in its action than either antipyrine or antifebrin, and it acts very rapidly notwithstanding its insolubility in the gastric juice. About twenty minutes after its administration its effects may be observed. It is employed in the various forms of neuralgia, hemicrania, acute rheumatism, vaso-motor neuroses, neurasthenia, locomotor ataxia, etc., etc.

Dose.—As an antineuralgic the dose ranges from eight to twenty-two and a half grains (one-half to one and one-half grams). Fifteen grains is the average dose. Good results are obtained by administering phenacetine in gr. v doses, once in an hour until gr. xv–xx are taken.

Dental Uses.—Phenacetine is employed in neuralgias of dental origin, acute periodontitis, and pericemental irritation.

PHENALGIN.

Formula.—C_6H_5,NH_2.

Derivation.—Phenalgin is a synthetic coal-tar product which may be chemically described as a compound product of the amido-benzine series. The ammonia is liberated in the stomach in a nascent state, and tends to neutralize and antagonize the depression which usually follows the administration of antipyretic products. It occurs as a white powder with an odor of ammonia.

Medical Properties and Physiological Action.—It is claimed that it exerts a stimulating effect on the heart, and that in doses of ten grains and upward, a sedative effect is produced in addition to its analgesic actions on the sensory apparatus of the nervous system.

The stimulating effect of the ammonia constituent is first perceived, and this is soon followed by a soothing sensation, due to the gradual subsidence of the painful manifestations. It has no toxic properties.

Therapeutic Uses.—It is claimed for phenalgin that it is hypnotic, anodyne, analgesic, antipyretic, antiperiodic. It is em-

ployed in all painful affections, such as neuralgia, rheumatism, gastralgia, painful menstruation, headache, effects of dissipation, migraine, influenza, insomnia, etc., for its anodyne and hypnotic properties.

Dose.—Of phenalgin, gr. v to xx. It is administered in the form of tablets or in powder.

Dental Uses.—Phenalgin is serviceable in facial neuralgia, especially in neuralgias of the fifth nerve, the pain of periodontitis, and alveolar abscess, pulpitis. Dr. A. S. Atkinson states that permanent relief from painful alveolar abscess of two weeks' standing was obtained within one hour after prescribing phenalgin.

PHENATE OF COCAINE—CARBOLATE OF COCAINE.

Derivation.—Phenate of cocaine, as prepared by Merck, is, as its name implies, a combination of carbolic acid and cocaine containing seventy-five per cent. of the cocaine alkaloid. It is a slightly colored substance, of the consistence of thick honey, and possesses both antiseptic and anæsthetic properties. Hydrochlorate of cocaine is open to the serious objection that when applied to cut surfaces it causes dangerous systemic effects endangering the life of the patient, and has in a limited number of cases, it is asserted, caused death. The phenate of cocaine, on the other hand, containing the alkaloid, is not so prone to cause symptoms of cocaine poisoning or any bad after-effect. It is soluble in alcohol of from thirty to fifty per cent., such a solution possessing a faint odor of carbolic acid.

Therapeutic Uses.—Dr. D. B. Kyle regards phenate of cocaine to be as good a local anæsthetic as the muriate of cocaine, and devoid of the dangerous systemic effects of the latter. The phenate of cocaine has been employed successfully in cases of cardiac disease and albuminuria, conditions which contra-indicate the use of muriate of cocaine. It is also claimed to be equal to any carbolized solution for its antiseptic properties. It can be safely used on cut surfaces. Another advantage claimed for the phenate over the muriate of cocaine is that it coagulates the albumen in the tissue, preventing the absorption of the cocaine, thereby prolonging the anæsthetic effect, although the length of time necessary to produce anæsthesia is somewhat longer than

that required for the hydrochlorate of cocaine. Phenate of cocaine is employed locally, internally, hypodermically, and in powder.

Dose.—The dose of phenate of cocaine is from 1/12 to 1/6 of a grain. Hypodermically for operations involving the deeper tissue, the eight or ten per cent. solution will usually produce sufficient anæsthesia, although it may be applied locally in a fifty per cent. solution, the strength in which it is sold in alcoholic solution for convenience of dilution. In solution of the strength of 50 per cent. it will coagulate albumen, and when topically applied to a mucous surface, such a strength may cause a slight slough, which may be avoided by applying glycerine to the dried surface before applying the phenate of cocaine. The 50 per cent. solution may be diluted to any extent desired by adding to it equal parts of alcohol and water. When diluted to a 25 per cent. solution its power to coagulate albumen is overcome.

Dental Uses.—Phenate of cocaine is employed as a local anæsthetic for the extraction of teeth, and when employed in a 50 per cent. strength or diluted, it is applied to the gum, previously dried, about the tooth, on a pledget of cotton, which is allowed to remain for from three or five minutes, and repeated if the anæsthesia is not sufficient. As in the use of all other local anæsthetics applied to the mouth, the patient should be cautioned not to swallow during the operation, to avoid the benumbing effect on the throat. Phenate of cocaine is also used locally for opening alveolar abscessess, treating exposed pulps, for sensitive dentine, removing tumors hypertrophy of tonsils (carefully applied), chronic and specific ulcers, earache, removal of polypi, hypertrophic growths, and other obstructions, etc. It is claimed for phenate of cocaine that it not only relieves pain, but checks the progress of the disease.

PHOSPHATES AND PHOSPHITES.

The Phosphates are ingredients of most of the animal and vegetable foods, and a sufficient amount of phosphorus is, under normal conditions, appropriated by digestive action for the supply of the system. Every part of the body contains phosphate of lime; and rickets, softening of the bones and defective teeth result when too little is supplied during the formative period. The

blood, saliva, gastric juice, urine, milk and the entire intercellular fluid contain phosphate of lime in solution. When this agent is administered by the stomach, diffusion into the blood results as a consequence of its being to some extent soluble in lactic and hydrochloric acids; hence it is very essential to the nutrition of the body, and small doses are as effective as large ones, as all in excess of the quantity soluble in the acids of the stomach is not appropriated, but passes off or forms concretions in the intestines. Phosphate of sodium is also a constituent of the blood, and by removing morbid states of the mucous membrane it promotes digestion and improves nutrition and the tone of the nervous system. Large doses, on the other hand, when administered in health, will impair digestion. Phosphorus exists generally as a phosphate, and has a strong affinity for oxygen, compounds being rapidly formed in the stomach; but some of it may enter the blood uncombined. It is a powerful irritant poison, the dose being no larger than 1/100 to 1/20 of a grain.

The preparation of the phosphates and phosphites are:

Syrupus Calcii Lacto-phosphatis.—Syrup of the lacto-phosphate of lime. *Dose.*—f℥j to f℥j. (See Syrup of lacto-phosphate of lime.)

Compound Syrup of the Phosphates.—Each drachm contains two and a half grains of phosphate of iron and one grain of phosphate of lime.

Sodii Phosphats—Phœphate of Sodium.—In the form of large, colorless, transparent prisms, with a cooling saline taste, feebly alkaline and no odor, and a slightly alkaline reaction. Soluble in six parts of water at 60° F., and in two parts of boiling water. *Dose.*—f℥j to f℥j.

Calcii Phosphate Præcipitatus.—Precipitated Phosphate of Lime. In the form of a white powder, with no taste or odor, and insoluble in water or alcohol. *Dose.*—Gr. ij to gr. v.

Syrupus Hypophosphitum.—Syrup of Hypophosphites. Composed of hypophosphites of calcium, sodium and potassium. *Dose.*—f℥j.

Sodii Pyrophosphas.—Pyrophosphate of Sodium. In the form of colorless, translucent prisms, with a cooling saline taste and a feeble alkaline reaction, but no odor, soluble in water, but insoluble in alcohol. *Dose.*—f℥ss to f℥ss.

Sodii Hypophosphis.—Hypophosphite of Sodium. In the form of small, colorless or white prisms, or a white granular powder with a sweetish saline taste, and a neutral reaction, and soluble in water. *Dose.*—Gr. v to gr. x.

Therapeutic Uses.—The phosphates are useful in rickets, mollities ossium, non-union of fractures, soft teeth of children, caries and necrosis of bone, anemia of nursing mothers, chronic bronchitis, leucorrhœa. The phosphate of soda in bilious sick headache, hepatic colic, jaundice, carbuncles, boils, etc., etc. The hypophosphites in phthisis, emphysema, fibroid lung, chronic tuberculosis, dilated bronchi, skin diseases, and all diseases characterized by malnutrition. Phosphoric and hypophosphoric acids are frequently combined with many vegetable and mineral tonics. The hypophosphites fulfill nearly all the indications of phosphorus itself.

PINUS CANADENSIS—ABIES CANADENSIS.

Hemlock, hemlock spruce of the United States and Canada. The medicinal portions are the juice and bark. The concrete juice, which is known as *Pix Canadensis*—Canada pitch—is a yellowish or faintly greenish, transparent, viscid liquid, when fresh, but afterward becomes an opaque, reddish -brown, hard and brittle mass, which contains resin and a volatile oil. It is used to make rubefacient plasters. The bark is rough and deeply furrowed, and is very astringent, possessing properties similar to those of the white-oak bark. An extract prepared from the bark is used as a topical astringent, but it is not considered to have any advantages over other common vegetable astringents:

For Inflamed Mucous Membrane, and for Use after the Removal of Salivary Calculus.

A. W. Harlan.

℞ Pinus canadensis (white) . . . . . ℥ss
Aquæ Rosæ . . . . . ℥iijss
Eugenol . . . . . ♏xxx.

Signa.—Use as a lotion or on a tooth-brush, 3 times daily.

PISCIDIA ERYTHRINA—JAMAICA DOGWOOD.

Source.—Jamaica Dogwood is a plant indigenous to the West Indies, where it has been used as an intoxicant in taking fish. The bark is the officinal portion, and is smooth and bright-colored.

Medical Properties and Action.—Jamaica dogwood is a powerful narcotic, and, in a measure, tonic and diuretic. Its narcotic properties are supposed to be superior to opium, as it does not cause the disagreeable after-effects common to that drug. When chewed, Jamaica dogwood has an unpleasant, acrimonious taste. It yields its virtues to alcohol, but not to water. Its internal use is generally followed by a sensation of heat, gradually extending to the surface, and succeeded by profuse perspiration, with profound sleep. In large doses it produces general paralysis, and death from asphyxia. It has been used as a substitute for morphine, which it resembles in many respects.

Therapeutic Uses.—The principal use of Jamaica dogwood is in neuralgia, in the form of a tincture composed of Jamaica dogwood ℥j, rectified spirits f℥iv. It is effectual in acute pains usually, and is said to be efficacious in lunacy, and cough of phthisis.

Dose.—Of the tincture of Jamaica dogwood, f℥j.

Dental Uses.—Jamaica dogwood, in the form of the tincture, is efficacious in trigeminal neuralgia, and in odontalgia resulting from an irritable pulp, for which purposes a fluid drachm in cold water may be taken internally, and applied externally in the case of odontalgia, being introduced on a pledget of cotton into the carious cavity.

PLUMBI ACETAS—ACETATE OF LEAD.

SUGAR OF LEAD.

Formula.—$Pb(C_2H_3O_2)_2 + 3H_2O$.

Derivation.—Acetate of Lead is obtained by immersing lead in distilled vinegar, or litharge in pyroligneous or crude acetic acid; when the acid has become saturated, the solution is permitted to cool and crystallize.

Acetate of lead is a white salt, in the form of beautiful brilliant, needle-shaped crystals, like long prisms, which affloresce on ex-

posure to the air. It has a sweet, astringent taste, and an odor of acetic acid, and is soluble in 2.3 parts of cold water and 21 parts of alcohol.

Medical Properties and Action.—Acetate of lead is sedative and astringent, checking the secretions and reducing the activity of the capillary system, and diminishing the force and frequency of the pulse; it coagulates albumen and is a very active mineral astringent of a sedative class. Like all the salts of lead, it is an irritant and corrosive poison, causing gastro-enteric inflammation. It requires, however, a large quantity (not less than half an ounce) of the acetate of lead to destroy life, as much of it is rejected by vomiting. The symptoms of lead poisoning, when the lead is slowly introduced into the system, are loss of appetite and strength, wasting of flesh, paleness of the face, constipation, pain in the joints, dry colic, which is relieved by pressure, neuralgia of the abdominal muscles, contraction of the intestines, belly drawn toward the spinal column, contraction of the liver, jaundiced skin, yellow conjunctiva, urine colored with biliary coloring matter, a blue line along the margin of the gum, about the incisor teeth; also at times a bluish discoloration of the mucous membrane of the lips and mouth, dimness of vision, paralysis of the extensor muscles of the fingers and arms, death resulting from the gradual failure of nutrition and the paralysis of the muscles of respiration; the blue line is caused by a deposit of lead sulphide in the gum tissue.

When the poisonous dose is large, there is intense gastric irritation, numbness, paralysis, coma and collapse. Iodide of potassium in larger doses, also Epsom salts and sulphur baths, are the antidotes in chronic cases of lead poisoning, and for the lead colic, alum in doses of one or two drachms every three or four hours, dissolved in some demulcent liquid, is considered to be the best remedy. For the treatment of lead paralysis, strychnia and electricity are employed. The blue or slate-colored line on the gums is supposed to be due to a deposition of the sulphide of lead.

Therapeutic Uses.—Acetate of lead is internally administered in dysentery, diarrhœa, cholera, cholera morbus, phthisis, chronic bronchitis, pneumonia, diseases of the heart, hemorrhage from the lungs, stomach, kidneys, nose, etc.; diseases of the eye, erysipelas, skin diseases, chronic gastric catarrh, gastralgia, pyrosis, summer

diarrhœa of children, humid asthma, whooping-cough, etc.; but the danger of producing toxic effects must be remembered in its internal use.

Externally, solutions of lead are employed to relieve superficial inflammations, arrest morbid discharges, and allay the pain of acute inflammations. Lead should not be given with natural waters containing lime, carbonic acid, mineral acids and salts, vegetable acids or vegetable astringents, iodide of potassium and preparations of opium.

Dose.—Of plumbi acetas, gr. ss or j to gr. v, two or three times a day.

Liquor Plumbi Subacetatis Dilutus.—*Diluted Solution of Subacetate of Lead.—Lead water* is composed of subacetate of lead solution, f℥ij; distilled water, Oj; and is a mild astringent and sedative when applied externally; it is never prescribed internally. It arrests discharges from suppurating and ulcerated mucous surfaces, and promotes the resolution of acute superficial inflammations.

Dental Uses.—Lead water is employed in dental practice, to relieve inflamed gums and mucous membrane of the mouth; as an application to indolent and foul ulcers; also in the treatment of teeth after the devitalization and removal of the pulps, to prevent peridental trouble.

It proves serviceable when applied to chapped hands and lips. A good ointment for such a purpose is composed of a combination of lead water, camphor, white wax, and oil of almonds.

DENTAL FORMULÆ.

For Acute Inflammation of the Mucous Membrane of the Mouth and the Gums.

℞ Plumbi acetatis . . ℥j
Tinct. opii . . . . . ℥ss
Aquæ . . . . . ℥x. M.

Signa.—Apply as a lotion, on lint.

For Periodontitis.

McQuillen.

℞ Liq. plumbi subacetatis . . . . . ℈ij
Tinct. opii . . . . . ℥ij. M.

Signa.—Apply to cavity on cotton and to gum externally.

Collyrium.

Dr. Gross.

℞ Liq. plumbi subacetatis . . . . . ℥j
Tinct. opii . . . . . ℥j
Aquæ, q.s.ad . . . . ℥viij. M.
Fiat lotio.

Signa.—Use as a lotion.

For Chapped Hands and Lips.

℞ Liq. plumbi subacetatis dilutus . . . . ℥vj
Camphoræ . . . . . gr.xl
Ceræ albæ . . . . . ℥viij M.
Olei amygdalæ dulcis Oj.
Fiat cerat.

SIGNA.—Apply as an ointment.

For Inflamed Gums and After Tooth Extraction.

℞ Plumbi acetatis . . gr.xv
Tinct. opii . . . . . f℥ij
Aquæ . . . . . f℥iij. M.

SIGNA.—Use as a lotion and mouth wash.

Compress to Prevent Pus Pointing on Face.

DR. H. H. BURCHARD.

℞ Plumbi subacet . . ℥j
Tr. opii . . . . . ℥j
Aquæ . . . . . Oj. M.

Collyrium.

DR. STURGIS.

℞ Liq. plumbi subacetatis,
Tinct. opii . . . . . āā℥j
Aquæ, q.s.ad. . . . . ℥viij. M.
Fiat lotio.

SIGNA.—Use as a lotion.

POTASSA CAUSTICA—CAUSTIC POTASH.

HYDRATE OF POTASH—FUSED POTASH—OXIDE OF POTASSIUM.

Formula.—KOH.

Derivation.—Caustic Potash is prepared by boiling a solution of potash until ebullition ceases, and the potassa melts or assumes a solidified consistence, when it is poured into suitable moulds and kept in well-stoppered bottles, as it rapidly deliquesces when exposed to the air. It dissolves in water and alcohol, and attracts moisture. Its officinal form is that of sticks of a white and somewhat transparent color, but upon exposure to the air, or if it is impure, it becomes a dingy gray, greenish or bluish color, and has the odor of slaking lime. When it is digested in alcohol, so as to free it from such impurities as are insoluble in alcohol, it is called *alcoholic potassa.*

Medical Properties and Action.—Caustic Potash is the most powerful caustic and escharotic in use, and, when taken internally, is a corrosive poison. It is only employed externally. When applied to a part, it rapidly destroys its vitality to a considerable depth, differing in this respect from nitrate of silver (lunar caustic), as the latter is more limited in its action, and does not liquefy when it comes in contact with the tissues. From the penetrating action of caustic potash, it is necessary to use it with great care. Its action is more easily controlled than that of arsenic, and can be completely arrested by weak acids. It is

very deliquescent, which is a great objection to its use in some cases, but when mixed with an equal quantity of lime, the deliquescent action is in a measure prevented; it is then known as *potassa cum calce*—potassa with lime—and is in the form of a grayish-white powder, which is sometimes made into a paste, under the name of *Vienna Paste*, which is milder and less deliquescent.

Therapeutic Uses.—Caustic potassa is chiefly employed to open abscesses, and in the treatment of chancres, hospital gangrene, eczema, malignant growths, to arrest the sloughing of carbuncles; in tetanus, applied to the spine; bites of rabid animals and venomous reptiles; phlegmons and incipient carbuncles, to arrest their progress; to form issues, etc. To prevent its coming in contact with neighboring parts, a piece of adhesive plaster is used, with an opening corresponding in size to the surface on which the caustic is to act. When mixed with water, in the proportion of caustic potash, ℥iss to water, f℥ij, it forms a rubefacient solution.

Dental Uses.—In dental practice, caustic potassa is employed in gangrene of the mouth (cancrum oris), malignant growths, fungous growths of gum, ulcers, etc.; for opening abscesses, when it is not prudent to use the lancet. Caustic potash forms one of the ingredients of Robinson's Remedy employed in the treatment of alveolar pyorrhœa, and sensitive dentine.

POTASSIUM BICARBONAS—BICARBONATE OF POTASSIUM.

Formula.—$KHCO_3$.

Derivation.—Bicarbonate of potassium is obtained by passing carbonic acid through an aqueous solution of carbonate of potassium, until it is completely saturated. The solution is then filtered and evaporated, the product being bicarbonate of potassium, in the form of transparent, colorless crystals, of the shape of irregular eight-sided prisms. It is inodorous, with a saline and somewhat alkaline taste, and is soluble in water, but insoluble in alcohol. Its incompatibles are acids and acidulous salts, etc.

Medical Properties and Action.—Bicarbonate of potassium is antacid, diuretic and antilithic. In large quantities it is a corrosive poison.

Therapeutic Uses.—It is employed internally in acute rheumatism, gout, and uric acid lithiasis, diseases of the skin, calculous affections, etc., etc.

Dose.—Of bicarbonate of potassium, gr. v to ℈j.

Dental Uses.—Bicarbonate of potassium is employed in dental practice as an antacid, a solution being serviceable as a mouth-wash, to prevent injury to the teeth from acid medicines.

DENTAL FORMULÆ.

For Neuralgia.

J. E. GARRETSON.

℞ Ferri sulphatis exsic.,
Potassii carbonatis āāgr.ccl
Syrup acaciæ . . . q.s. M.
Ft. pil. No. 100.

SIGNA.—Begin with 3 a day and increase to 6; take several hundred.

For Facial Neuralgia.

WALES.

℞ Potassii bicarb . . . ʒss
Ext. ergotæ fluidi . . fʒj
Infusi ergotæ . . . fʒvj. M.

SIGNA.—Two tablespoonfuls every 4 hours.

POTASSIUM AND SODIUM—KALIUM-NATRIUM.

A compound or alloy of potassium and sodium—*kalium-natrium*—in the form of a soft, almost semi-fluid mass prepared by Dr. Emil Schreier, and employed for the treatment of putrescent pulp-canals. Dr. Schreier claims that when these two alkali metals are inserted into the pulp-canal they come in contact with a watery liquid, when immediately violent reaction takes place, the water is decomposed, with the development of considerable heat, by the production of potassium and sodium hydroxide and hydrogen. The sodium and potassium hydroxides unite with the fatty substances to form soap, which accounts for the characteristic odor. The compound, which is contained in a tube, is applied to the root-canal as follows: When the cork stopper is removed a paraffin layer covering the preparation is exposed. A barbed nerve-extractor is then pushed through this paraffin layer into the preparation, and upon gently withdrawing the instrument small particles of the potassium and sodium compound adhere to the barbs of the instrument, in which condition it is ready for introduction into the pulp-canal. Dr. Schreier advises care as to its use, especially avoiding an excess at any one application; otherwise the action would be too violent.

The rubber-dam should be applied in all cases. Practical tests of this compound have given satisfactory results.

POTASSI BROMIDUM—BROMIDE OF POTASSIUM.

Formula.—KBr.

Derivation.—Bromide of potassium is obtained by adding a solution of pure carbonate of potassium to a solution of bromide of iron. The iron being precipitated, the bromide of potassium is obtained from the solution by evaporation. It is in the form of white crystals, without odor, wholly soluble in water, and but sparingly soluble in alcohol, and having a pungent, saline taste.

Medical Properties and Action.—Bromide of potassium is stimulant, sedative, narcotic and antispasmodic, and, being absorbed into the system, can be detected in the blood, urine, fæces and mucus. If administered in considerable quantity, the action of the heart, respiration, and the temperature are depressed, and although in some cases a transient excitement may be caused by large doses, the effect of this agent is to induce a sound and refreshing sleep, and if its use is long continued, a constant drowsiness is experienced. Bromide of potassium has also the power of lessening the sensibility to pain, especially causing a loss of sensibility of touch in the case of the mucous membrane and skin, which is due to the local action of the salt as it is eliminated. The long-continued use of this agent also causes a loss of motion, and if it is injected into the tissues of a limb, it will cause paralysis of motion and sensibility. It also diminishes the sexual feeling, and the condition which a long course of the bromides develop is known as *bromism*, which is characterized by weakness of mind, confusion, headache, pallor, and anæmia, uncertain gait, etc.

Therapeutic Uses.—Bromide of potassium is employed as an internal remedy in cerebral affections, acute rheumatism, chlorea infantum, seasickness, vomiting of pregnancy, affections of the heart, as shown by increased action, neuralgia, maniacal excitement, tetanus, strychnia poisoning, epilepsy, spasmodic asthma, spasmodic cough, etc., etc.

Dose.—Of bromide of potassium, gr. v to ℥j; for continuous administration 1 to 2 grains.

Dental Uses.—Bromide of potassium is a useful remedy in infantile convulsions from the irritation of dentine, and is also efficacious in preventing such conditions by relieving the irritation; also in neuralgia, due to diseased teeth, and in facial neuralgia when congestive in character. When combined with morphine, bromide of potassium is useful for neuralgia of the fifth nerve in the adult.

As its local effect is to diminish sensibility, it has been applied to the pharynx and velum palati, in order to prepare such parts for the taking of impressions for artificial palates, and to overcome extreme susceptibility of the mucous membrane of the roof of the mouth in first wearing artificial dentures. For such purposes the agent is administered in one-half drachm doses 3 times daily for two or three weeks previously; or doses of grs. xx to xxx may be given, repeated two or three times.

DENTAL FORMULÆ.

For Infantile Diarrhœa from Reflex Nervous Impressions.

℞ Potassi bromidi . . . . . gr.xviij to ℥ss
Potassi nitratus . . . . . gr.vj
Sacchari lactis . . . . . ℥ss. M.
Ft. pulv. vj.
SIGNA.—One powder every 3 or 4 hours to a child 1 year of age.

For Infantile Convulsions.

DR. E. H. LONG.

℞ Potassii bromidi . . . . . ℥ijss
Antipyrini . . . . . gr.xlv
Glycerini . . . . . f℥ijss
Aquæ menthæ, piperitæ . . . . . f℥ij. M.
SIGNA.—One-half to one teaspoonful: may repeat in one hour.

POTASSII CHLORAS—CHLORATE OF POTASSIUM.

Formula.—$KClO_3$.

Derivation.—Chlorate of potassium is obtained by passing an excess of chlorine through a solution of carbonate of potassa and slaked lime; the chlorine being converted into chloric acid by the hydrogen of the lime and the acid combining with the

potassa, forming chlorate of potassium. It is in the form of colorless or white crystals, of a pearly lustre, altogether soluble in distilled water, and in twelve parts of cold and two parts of boiling water. It is inodorous, with a cool, saline taste, and when applied to animal fluids does not decompose them nor undergo any change, although perfectly soluble in such fluids; it is soluble in 16.7 parts of water, and insoluble in alcohol. It is absorbed by the blood, and is eliminated by the kidneys.

Medical Properties and Action.—Chlorate of Potassium is detergent, refrigerant, diuretic and stimulant, and its action as a refrigerant and diuretic is similar to that of nitrate of potassa. It improves the appetite, and on account of the large quantity of oxygen it contains, has been employed in contaminated conditions of the blood as an oxidizing agent. Although it may be administered with impunity in very large doses, yet excessive quantities have given rise to gastro-enteric inflammation, with fatal effects.

Therapeutic Uses.—Chlorate of Potassium is employed in continued and typhoid fevers, neuralgia, croup, diphtheria, sore throat, chronic bronchitis, phthisis, scrofula, erysipelas, scurvy, mercurial salivation, etc., etc. Externally, it is employed in the treatment of ozæna, sore throat of scarlatina, pharyngitis, cancerous sores, ulcerated surfaces, fetid and scrofulous ulcers, etc., etc. Poisonous symptoms have resulted from the habitual use of chlorate of potassium, and several cases of death have been recorded.

Dose.—Of chlorate of potassium, gr. v to ℈j, every three or four hours; for children, gr. iij in sweetened water every four hours for a child three years of age; gr. v for one of eight or nine years, with due attention to the bowels and constitution, regulating the former and supporting the latter. In the case of teething children, gr. ij may be administered to a child of one year of age. Explosion is liable to occur when chlorate of potassium comes in contact with organic matters, and it is also incompatible with sulphuric and hydrochloric acids; in aqueous solution it is precipitated by nitrate of silver and the iodide of iron.

Troches of Chlorate of Potassium are prepared by a combination of chlorate of potassium, ℥v; sugar, ℥xviij; tragacanth, ℥ij; vanilla, gr. xxx; mixed together with water into a mass and

divided into 480 troches, each of which contains gr. v of chlorate of potassium; useful for sore throat, etc.

Dental Uses.—Chlorate of potassium is a valuable agent in dental practice as an internal and external resolvent and detergent remedy in the various forms of stomatitis—inflammation of the gums, aphthæ and other ulcerative affections, gangrenous stomatitis, mercurial stomatitis, erysipelatous inflammation of the mouth, scurvy, ulcers of the gums, cheeks and tongue, abraded surfaces of mucous membrane, secondary syphilitic ulcerations of the mouth, indolent and scrofulous ulcers, etc., for such purposes being used alone in the form of mouth-washes or gargles, or in combination with tannic acid, alum, borax, glycerine, etc. In the treatment of mercurial stomatitis, great benefit is derived from both its internal and external use. For the inflamed gums of teething children it is employed as a lotion, with beneficial effects. In the form of powder it is a useful application to ulcerated and abraded surfaces. A simple gargle or mouth-wash may be made by dissolving one drachm of chlorate of potassium in four ounces of water, or half an ounce may be dissolved in a pint of water.

DENTAL FORMULÆ.

For Inflamed Gums after the Extraction of Teeth.

℞ Potassii chloratis . . ʒij
Tincture krameriæ,
Glycerini . . . . āā fʒss
Aquæ Rosæ . . . . ʒviij. M.
SIGNA.—To be used as a gargle 6 or 8 times daily, to harden the gums.

For Ulcers and Suppurating Wounds.

℞ Potassii chloratis . . ʒj
Glycerini . . . . . ʒiss. M.
SIGNA.—To be used as a lotion.

For Aphthous and Secondary Syphilitic Ulceration of the Mouth and Fauces.

℞ Potassii chloratis . . ʒiv
Aquæ destillatæ . . . ʒx. M.
SIGNA.—To be used as an antiseptic mouth-wash.

For Ulceration of the Mouth.

BARTHOLOW.

℞ Potassii chloratis . . ʒj
Acidi carbolici . . . ʒss
Aquæ destillatæ . . . ʒiv. M.
SIGNA.—To be used as a lotion.

For Ulceration and Inflammation of the Gums and Mucous Membrane.

STOCKEN.

℞ Potassii chloratis . . ʒij
Sodii biboratis . . ʒj
Potassii nitratis . . ʒss
Aquæ destillatæ . . . ʒviij. M.
SIGNA.—To be used as a gargle.

For Inflammation of Gums and Mucous Membrane.

STOCKEN.

℞ Potassii chloratis . . ℥ij
Sodii biboratis . . . ℥j
Potassii nitratis . . ℥ss
Tinct. Arnicæ . . . ℥ij
Aquæ Rosæ . . . . ℥vij. M.

SIGNA.—To be used as a gargle.

For Inflamed Gums, Mucous Membrane, etc.

℞ Potassii chloratis . . ℥j
Sodii biboratis . . ℥j
Aquæ destillatæ . . . ℥ij. M.

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

For Inflamed Gums and Mouth.

℞ Potassii chloratis . . ℥ij
Pulv. aluminis . . . ℥ij
Aquæ destillatæ . . . ℥x. M.

SIGNA.—To be used as a gargle.

For Inflamed Mucous Membrane.

℞ Potassii chloratis . ℥j
Aluminæ sulph. . . . ℥j
Aquæ destillatæ . . . ℥iv. M.

SIGNA.—To be applied as a mouth-wash.

For Periodontitis.

℞ Potassii chloratis . . ℥j
Plumbi acetas . . . ℈j
Aquæ font. . . . . ℥ij. M.

SIGNA.—To be used as a mouth-wash.

For Ulceration of Gums and Mucous Membrane of Mouth.

℞ Potassii chloratis . . ℥ij
Aquæ . . . . . ℥v. M.

SIGNA.—A tablespoonful three times a day; also as a gargle four or five times a day.

POTASSI NITRAS—NITRATE OF POTASSIUM.

SALTPETRE—NITRE.

Formula.—KNO_3.

Derivation.—Nitrate of Potassium is obtained in the native state in various portions of the world; but the variety employed for medicinal purposes is prepared by purifying the native production of India. It can also be artificially made by combining decayed organic animal and vegetable matters, or by the double decomposition of nitrate of sodium and chlorate of potassium. The crude nitre is refined by re-solution and crystallization. It is in the form of white, crystalline, six-sided prisms, odorless, with a sharp, saline, cooling and slightly bitter taste, wholly soluble in water, but insoluble in alcohol.

Medical Properties and Action.—Nitrate of potassium is refrigerant, sedative, antiseptic, diuretic and diaphoretic. It promotes the secretions, lessens the heat of the body and the frequency of the pulse. For allaying febrile excitement it is frequently employed in the form of *nitrous* powders (nitre, gr. x; tartar emetic, gr. 1/8; calomel, gr. 1/4 to 1/2).

In overdoses, nitrate of potassium causes pain and heat in the stomach, vomiting and purging of blood, inflammation of the bowels, great prostration, convulsions, and sometimes death. The antidotes are emetics, mucilaginous and demulcent drinks, and stimulants to sustain the sinking powers of the system.

Therapeutic Uses.—Nitrate of potassium is employed internally as a refrigerant in febrile affections, in inflammatory diseases, acute rheumatism, scurvy, purpura, hæmoptysis, passive hemorrhages, asthma, etc. In fevers it is frequently combined with other remedies. The vapor is used in spasmodic asthma.

Dose.—Of nitrate of potassium, gr. ij to gr. x.

Dental Uses.—In dental practice, nitrate of potassium has been recommended in the incipient stages of alveolar abscess, being introduced into the pulp canal and secured by a temporary filling in the crown cavity of the tooth. It is also employed in inflammatory conditions of the mucous membrane of the mouth and throat in the form of gargles. (*See Argyrol.*)

DENTAL FORMULÆ.

For Inflammation of the Mouth and Throat.

J. W. White.

℞ Potassii nitratis . . ʒj to ʒij
Aquæ destillatæ . . . Oj. M.
Signa.—To be used as a gargle.

For Inflamed Mucous Membrane and Gums.

℞ Potassii nitratis . . ʒss
Potassii chloratis . . ʒij
Sodii biboratis . . . ʒj
Aquæ destillata . . ʒviij. M.
Signa.—To be used as an antiseptic and refrigerant mouth-wash.

POTASSII PERMANGANAS—PERMANGANATE OF POTASSIUM.

Formula.—$K_2Mn_2O_8$.

Derivation.—Permanganate of potassium is obtained by the mixture of equal parts of black oxide of manganese and chlorate of potassium, with a slight excess of caustic potassa, dissolving in water, and evaporating to dryness, when it is exposed to a nearly red heat; the chlorate of potassium yields oxygen, which changes the black oxide of manganese into permanganic acid, and this acid, combining with the potassa, gives as a product the permanganate of potassium. It is in the form of dark purple, slender, prismatic crystals, inodorous, very soluble in water,

forming a solution of a beautiful lilac color, even in very minute proportion, and with a sweet, astringent taste; it is soluble in 16 parts of water.

Medical Properties and Action.—Permanganate of potassium when taken internally, is supposed to oxidize the blood. It is a stimulant, mild escharotic, and is a powerful disinfectant, as it has a remarkable power of destroying fetid odors from organic sources, and proves useful in preventing the spread of infectious disease. It yields up its oxygen readily, in the form of ozone, and its use depends upon this property. It is instantly decomposed on reaching the stomach.

Therapeutic Uses.—Permanganate of potassium is employed with advantage in dyspepsia, flatulence, excessive deposition of fat, uric acid diathesis, acute rheumatism, diabetes, scarlatina, petechial fever, spinal meningitis. Condy's Fluid is a favorite preparation with some, for both internal and external use. The most important uses for permanganate of potassium are externally, as a deodorizer and disinfectant, to correct the fetor of cancer, abscesses, ulcers, caries of bone, ozæna, otorrhœa, gonorrhœa, leucorrhœa, ulcerated sore throat, etc., in the form of injections, lotions and spray. It is also used externally in the treatment of diphtheria, in the proportion of a drachm of *Condy's Fluid* to the ounce of water. In solution, permanganate of potassium is applied in varying strength, according to the effect desired. As a local stimulant, as well as deodorizer, it is useful in chronic and indolent ulcers, carbuncles, hospital gangrene, etc. The powder may be sprinkled on gangrenous surfaces. In concentrated solution permanganate of potassium acts as a caustic. A strong solution is composed of 10 parts dissolved in 90 parts of water, and is employed in its full strength in cancerous, phagedenic and atonic ulcers. For dressing simple wounds, or as an injection in abscesses, ozæna, leucorrhœa, etc., half a fluid ounce of the solution may be added to a pint of water; in gangrenous and diphtheritic wounds and scrofulous ulcers, a fluid ounce of the solution to a pint of water. In 1 per cent. solution permanganate of potash will destroy bacteria, a mouth-wash of the strength of 1:1000 is efficient; it is also a chemical antidote to morphine.

Dose.—Of permanganate of potassium for internal use, gr. 1/4

to gr. j, three times a day. *Condy's Fluid* is composed of 32 grains of permanganate of potassium in one pint of distilled water; half-fluid ounce contains one grain. Dose of *Condy's Fluid*, ɱv. For external application, f℥j, to water, f℥v to x. Solution of permanganate of potassium—*Liquor Potassii Permanganatis*—is composed of 64 grains of permanganate of potassium to one pint of distilled water. M. de Lacerda has recently discovered that permanganate of potassium is one of the most energetic antidotes to the venom of snakes.

Dental Uses.—In dental practice the permanganate of potassium is employed in the treatment of fetid and gangrenous ulcerations of the mouth, such as cancrum oris, foul abscesses, ulcerations of mucous membrane attended with fetid discharges, offensive breath; as an antiseptic in decomposing pulps of teeth (grs. ij to water ℥j); in diseases of the antrum, such as abscess, and caries and necrosis of the maxillary bones, Riggs' disease, ulcers of the mouth, pyorrhœa alveolaris, etc. (grs. x to water ℥j). The powdered crystals introduced into a carious cavity will relieve odontalgia. The stains of permanganate of potassium can be removed by dilute hydrochloric acid.

DENTAL FORMULÆ.

For Unhealthy Ulcers of the Mouth, and Offensive Breath.

J. W. White.

℞ Potas. permanganatis ℈j to iv
Aquæ destillatæ . . . Oj. M.
Signa.—To be used as a gargle.

For Fetid Perspiration and Foul Breath.

℞ Potassii permanganatis gr. j.
Aquæ destillatæ . . . f℥i. M.
Signa.—To be used as a lotion and gargle.

For Gangrenous Ulceration of the Mouth—Cancrum Oris.

℞ Potassii permanganatis gr. xxx
Aquæ destillatæ . . . ℥j. M.
Signa.—Apply as a lotion.

For a Disinfectant in Mercurial Salivation.

℞ Potassii permanganatis gr. xv
Aquæ destillatæ . . j℥viij. M.
Signa.—Use as a gargle.

For Ulcers, Abscesses, Decomposing Pulps of Teeth, etc.

℞ Liquoris potassii permanganatis . . ℥j
Aquæ destillatæ . . . . . ℥vj to x. M.
Signa.—To be used as a gargle or as an injection.

PYRETHRUM—PELLITORY.

Source.—Pyrethrum is a native of the Mediterranean coast, and the root is the medicinal portion—*parethri radix*, in the form of cylindrical, wrinkled pieces, of the size of the little finger, hard and brittle, which, when dried, have little or no odor. Externally, it is of an ash-brown color, within white, and possesses an extremely acrid taste, with a burning and tingling sensation over the whole mouth and throat, which continues for some time, and excites a copious flow of saliva.

Medical Properties and Action.—Pyrethrum root is an irritant and sialogogue, and when it is rubbed on the skin it causes much irritation, and may even excite inflammation.

Its activity depends upon an acrid oil and a compound resin called *parethrin*. It is rarely used internally, and only as a masticatory.

Therapeutic Uses.—Pyrethrum has been employed as an excitant in paralysis of the tongue and muscles of the throat, relaxed sore throat, spontaneous salivation, certain forms of headache; for such purposes being chewed, or employed in the form of a gargle, in tincture or decoction.

Dose.—Of pyrethrum as a masticatory, gr. xv to ℥j. *Tinctura Pyrethri*, TINCTURE PYRETHRUM, is composed of pyrethrum ℥iv, rectified spirit Oj.

Dental Uses.—Pyrethrum has been employed in dental practice for neuralgic affections of the face, for which it is chewed; for the relief of odontalgia, in the form of the tincture applied to the irritable pulp on a pellet of cotton; as a stimulant to the gums and mucous membrane of the mouth in relaxed conditions; for obtunding sensitive dentine, in the form of a strong alcoholic extract. The *ethereal oil of pyrethrum* is recommended as a pleasant and efficacious remedy in odontalgia, applied in the same manner as the tincture; the fluid extract is also employed as an ingredient for local anæsthetic preparations, combined with chloroform, ether and lavender, etc. (See Chloroform).

DENTAL FORMULA.

For Relaxed Conditions of Mucous Membrane of Mouth and Gums.

℞ Tinctura pyrethri . . . . . f℥iij
Aquæ . . . . . ℥viij. M.

SIGNA.—To be used as a stimulant gargle.

PYROZONE.

Formula.—H_2O_2.

Derivation.—Pyrozone has the same formula as peroxide of hydrogen, and is presented in the form of solution only. Various percentages have been produced which are devoid of poisonous properties and other objectionable features. It is presented in the following percentages: An aqueous medicinal solution of pyrozone, 3 per cent,; an ethereal solution which is antiseptic, 8 per cent., and a caustic ethereal solution of 25 per cent.—all of the same formula H_2O_2.

Medical Properties and Action.—The medicinal 3 per cent. aqueous solution acts with great rapidity, causing instant effervescence, and is a harmless antiseptic externally or internally. It is nearly neutral, and its cleansing effects in removing mucus are very effective. The ethereal 5 per cent. solution is powerfully antiseptic, and acts on pus with remarkable energy.

The caustic 25 per cent. solution, also ethereal, is the most powerful, and both it and the 5 per cent. solution, when applied to the skin, cause a tingling sensation and a marble whiteness. similar in appearance to that caused by carbolic acid; the discoloration of the pyrozone, however, disappears after some hours without leaving any marks or other bad effects.

The 25 per cent. solution is not only a powerful caustic, but is also considered to be a very safe one, as the rapid evaporation of its solvent—ether—leaves the concentrated H_2O_2 behind. When not in use these solutions should be kept from contact with organic matters, on account of their rapid action. All of the pyrozone solutions are prompt hemostatics; but the 3 per cent. solution is the best for such a purpose, for the reason that its caustic action is less than that of the 5 per cent. or 25 per cent. solutions.

All of the pyrozone solutions are bleachers, but the 5 per cent. and 25 per cent. solutions act more promptly for such a purpose, on account of the action of the hydrogen on organic coloring matter, and not by reaction due to acid. The painful sensation produced by the stronger solutions coming in contact with a healthy surface may be quickly relieved by rubbing freely with tannin and glycerine; and if gloves are worn on the hands placed in pockets, any stains on the fingers will disappear within one

hour, and no sloughing or soreness result. Care should be exercised as to the quantity of the pyrozone solution employed; hence cotton, or silk ropes, or tampons should not be so saturated as to permit an excess to be forced out and come in contact with healthy tissues or surfaces when the pyrozone is employed in a pocket or fistula. The 3 per cent. medicinal solution is put up in 4-ounce glass-stoppered bottles, and the 5 per cent. and 25 per cent. solutions in sealed glass tubes, the contents of which can be transferred to clean glass bottles with ground stoppers, not filled too full, and kept in an upright position.

Therapeutic Uses.—The 3 per cent. solution of pyrozone, being free from odor and toxic properties, may be used with advantage when carbolic acid or other disinfectant is indicated. In certain forms of indigestion or dyspepsia, ulcers of the stomach, and gastritis, the 3 per cent. solution may be given internally in doses of ℥j three times a day before meals. In long-standing epilepsy, Dr. B. W. Richardson has administered it in ℥ij doses twice daily. Externally, the 5 per cent. and 25 per cent. solutions have been employed in rhinitis, ulcerations, diphtheria, syphilitic ulcerations, old sinuses, fistulous tracts from bone disease, lupus erythematous, alopecia areata, ringworm, nasal diseases, etc., etc.

Dental Uses.—The 3 per cent. aqueous solution may be used freely as a mouth-wash, also as a gargle, but considerable irritation follows its contact with the throat. Used as a mouth-wash it will remove the oily deposit and absorbent coating on the teeth of smokers; also as an irrigating and detergent wash in abscesses, sinuses and ulcerations. The 3 per cent. aqueous solution is also recommended by Dr. C. B. Atkinson as a valuable adjunct in caring for a frequent condition of children's mouths, where, from malnutrition during gestation and the sundry eczemas of childhood, the teeth become pitted or wasted of the enamel, by which cavities are exposed to the destructive influence of caries, as the 3 per cent. solution both bleaches teeth in this condition and retards the progress of destruction.

The 3 per cent. solution is also effective as a wash or injection into large abscess pockets as an excellent cleanser and means of cure. As a bleaching agent the 3 per cent. solution, however, is less penetrating in its effects than either the 5 per cent. or 25 per cent. solutions; and used as a spray it will by its oxidizing

effect bring to the surface from between the teeth any pus present. It will also act upon any incrustations about the teeth, softening them and rendering their removal easy.

The 5 per cent. ethereal solution is employed in abscess pockets, fistula or sinuses, fistulous roots, alveolar pyorrhœa, small quantities only being used at a time. The solution may be dropped from an ordinary glass stopper, a drop at a time until the desired effect is produced; or it may be applied on a tapered piece of orange wood, or an attenuated glass rod, or as an injection with a syringe, or by a special pyrozone atomizer in the form of spray. In treating fistulæ of alveolar abscesses, the solution may be introduced on cotton or other tents, so that it may be carried well within the tract.

The 5 per cent. solution is also an efficient bleacher of discolored teeth, and causes no injurious action on the tooth structure, or on myxomatous tissues; and its application to ulcerating surfaces brings about a rapid reduction of the suppuration without a resulting coagulum.

The 5 per cent. ethereal solution of pyrozone appears to be more generally serviceable, but if the ether is permitted to evaporate it may become caustic, as concentration follows evaporation. For bleaching discolored teeth, a pledget of cotton saturated with the solution may be placed in the cavity, and the surface of the crown of the tooth be wiped over with the same 5 per cent. solution; it is also useful in removing the green stain common on the necks of children's teeth, but care must be taken that the solution does not touch the gums. Great care must also be taken not to allow the stronger pyrozone solutions to come in contact with an exposed pulp, as it expands such a tissue very greatly, and as a consequence causes excruciating pain.

The 25 per cent. solution of pyrozone is caustic in its action, and its use in preference to the 5 per cent. solution will depend upon the depth or rapidity of action required, as the 5 per cent. solution causes less pain, and may answer better when the mucous membrane is very irritable. To bleach a discolored tooth, or to rapidly cleanse a surface, or where the disease is difficult to reach on account of its depth, the 25 per cent. solution answers better than the 5 per cent. solution, on account of its prompt action. The antiseptic and caustic solutions of pyrozone

attack the hydrogen in the color compound in the tubuli, and when this is given off only water remains. For bleaching teeth the rubber dam is first adjusted, and the apical foramen of the root sealed; then by means of a glass atomizer, the pyrozone is sprayed into the pulp-chamber and canal, and also into the crown cavity. The effect is prompt and satisfactory. The solution may also be applied on cotton or bibulous paper, but no metallic instruments should be used in connection with the agent; and to renew the application it is better to drop the pyrozone on the cotton or paper, and not dip again into the bottle.

Pyrozone atomizers are constructed with three tubes, one each for the upper and lower teeth, and one straight tube for spraying other parts. For treating putrescent pulps and alveolar abscesses, the dam is adjusted, and the solution of pyrozonecarried into the root and apical space in the form of spray, or on cotton at the end of a wooden probe; the pyrozone being applied until the pus ceases to flow, when the root canal is filled with cotton, which is allowed to remain until the following day, when the filling may be inserted, or, if necessary, a second application of pyrozone made, which, however, is seldom, if ever, required. The contact of the antiseptic, and especially of the caustic solution of pyrozone, with the gum or skin causes a severe burning or pricking sensation, causing a white stain, more of the nature of a bleached spot than a true eschar, which may be prevented by previously painting the exposed parts with glycerin. The pain may be relieved by the application of glycerin, or glycerite of tannin, or a solution of bicarbonate of soda (ʒss to ʒj). For the deep pockets of alveolar pyorrhœa, a small tent of cotton may be saturated with the 25 per cent. solution, and its application will in most cases terminate the suppuration. (See Suppurative Gingivitis.)

In opening glass tubes containing pyrozone by filing a notch and then breaking off the point, care must be taken that particles of the glass do not enter the eye, by sudden explosion, and destroy the sight.

QUERCUS ALBA—WHITE OAK.

Source.—White oak, the dried inner bark of which is the medicinal portion, is a common tree of the natural order *Amentaceæ*.

The bark has a light-brown color, fibrous texture and an astringent bitter taste. Its medicinal virtues depend upon the presence of tannic and gallic acids, and a bitter principle known as *quercin*. Water and alcohol form with it decoctions and tinctures.

Medical Properties and Action.—White oak bark is tonic, astringent and antiperiodic. It is principally used as an external application.

Therapeutic Uses.—White oak bark is employed internally in the treatment of diarrhœa, dysentery and hemorrhoids. Externally in relaxation of the uvula, tonsils, etc.; gangrene, indolent ulcers, leucorrhœa, atonic menorrhagia, fissure of the anus, etc., etc., in the form of tincture, decoction, gargles, lotions and injections.

Decoction of White Oak Bark, *Decoctum Quercus Albæ*, is composed of oak bark, ℥j; water, Oj.

Dose.—Of powdered white oak bark, gr. xxx to gr. xl. Of the decoction the dose is f℥ss to f℥j.

Dental Uses.—In dental practice the decoction and tincture are employed externally in the various forms of stomatitis, sponginess of the gums, and relaxed condition of the mucous membrane of the mouth and fauces.

QUILLAYA SAPONARIA—QUILLAIA BARK.

SOUTH AMERICAN SOAP TREE BARK.

Source.—Quillaia Bark is obtained from an evergreen tree of the natural order *Rosaceæ*—rose order—growing in Chili and Peru, the inner bark being employed.

Medical Properties and Action.—Quillaia bark, when bruised and macerated in water, imparts to that liquid the property of frothing like soap solution when agitated, which is owing to the saponaria in the bark, the same principle which imparts a similar property to soapwort—*saponaria officinalis*. Quillaia contains no tannic acid or other bitter principle, and is an article of commerce, being imported in large quantities for cleansing grease from cloth, as it does not change the color of silken or woolen goods; it is also used for cleansing the hair, which it is supposed to preserve and beautify. When the powder is snuffed up the nostrils, it causes sneezing and a profuse nasal discharge.

Therapeutic Uses.—Quillaia bark has been employed as a

febrifuge, to arrest excessive secretion, as an application to ulcers, as a remedy for colds in the head, when it is used as a sternutatory, in the form of powder.

The tincture is composed of quillaia bark 1 part; alcohol 5 parts; it is also used in the form of infusion and fluid extract.

Dental Uses.—Quillaia bark, in the form of powder, tincture and fluid extract, is employed as an ingredient of mouth-washes, for its frothy and detergent properties; it is also used as an application to chronic ulcers of the mouth, and to arrest excessive secretion of the mucous membrane of the mouth.

DENTAL FORMULÆ.

Detergent Mouth-wash.

AM. JOURN. PHARM.

℞ Pulv. potassii bicarbonatis . . . . . ℥ss
Mellis . . . . . ℥iv
Alcoholis . . . . . ℥ij
Olei caryophylli . . q.s.
Olei gaultheriæ,
Quillaiæ saponariæ (fluid ext.) . . . . āā ℥j
Aquæ destillatæ . . . ℥ix. M.

To be used after the removal of salivary calculus.

For a Mouth-wash.

℞ Pulv. quillaiæ saponariæ . . . . . ℥iv
Glycerini . . . . . ℥iij
Alcoholis dilutus sufficient for two pints.
Olei gaultheriæ . . . gtt.xx
Olei menthæ . . . . gtt.xx. M

Macerate the soap bark in the mixture of glycerine and alcohol for three days, and filter through a little magnesia previously triturated with the volatile oils.

For Inflamed Gums and Mucous Membrane.

PROF. CHAPIN A. HARRIS.

℞ Quillaiæ saponariæ . ℥viij
Pyrethri,
Radicis iridis,
Acidi benzoici,
Cinnamomi . . . āā ℥j
Acidi tannici . . . . ℥iv
Sodii boratis . . . . ℈iv
Olei gaultheriæ . . . f℥ij
Olei menthæ . . . . f℥iv
Cochineal . . . . . ℥iij
Sacchari albi . . . . ℔j
Alcoholis . . . . . Oiij
Aquæ puræ . . . . . Ov. M.
Digest for six days and filter.

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

Mouth-wash.

DR. W. H. FOWLER.

℞ Fluid Ext. Soap Tree Bark . . . . . ℥i i/2
Alcohol . . . . . ℥ss
Glycerine . . . . . ℥jss
Hamamelis (Pond's Extract) . . . . ℥iij
Oil of wintergreen . ♏viij
Oil of cloves . . . . ♏v
Soft water . . . . . ℥viij

Dissolve the oils in the alcohol and then add the other ingredients.

QUININÆ SULPHAS—SULPHATE OF QUININE.

Formula.—$(C_{20}H_{24}N_2O_2)_2H_2O.SO_4+7H_2O$.

Derivation.—The two important alkaloid principles of cinchona are *quinia* and *cinchonia,* which exist in combination with *kinic* acid. (See Cinchona.)

Sulphate of Quinine is obtained by boiling the powdered yellow cinchona bark in water acidulated with hydrochloric acid, by which the alkaloid quinine is separated from kinic and other acids, and forms a soluble hydrochlorate or muriate, the sale being decomposed and the quinine precipitated by the addition of lime; sulphuric acid is added, after digestion in boiling alcohol, which dissolves the quinine, and the solution is boiled with animal charcoal, filtered and allowed to crystallize. Sulphate of quinine is in the form of colorless, very light and silky crystals, which are readily soluble in alcohol and in water acidulated with sulphuric acid, but insoluble in ether. It has an intensely bitter taste, and is inodorous; it is not very soluble in water except when an acid is combined with it.

Medical Properties and Action.—Sulphate of quinine is a very valuable tonic and antiperiodic, also antiseptic and stimulant. In small doses it increases the fullness of the pulse and action of the heart, and improves the tonicity of the capillary vessels, and is diffused into various parts of the system with great rapidity. In large doses it depresses the action of the heart, lowers the blood pressure, and enfeebles as well as diminishes the beats of the pulse. As it accumulates in the brain, it causes a fullness in the head, a constricted feeling about the forehead, a buzzing or ringing in the ears—*tinnitus aurium*—giddiness, vertigo and deafness, which may be permanent if the agent is taken in excessive quantity; also amaurosis and amblyopia may be caused by full doses. Poisonous doses cause intense headache, dilated pupils, delirium, coma and convulsions. Some five hours are required to bring about the greatest effect of quinine, although it can be detected in the urine in about half an hour after it is taken into the stomach, and elimination, chiefly by the kidneys, is not completed in a less time than 48 hours, although the principal portion is excreted in 12 hours. A condition known as *cinchonism,* the symptoms of which are ringing in the ears and fullness of the head; it is caused by the use of large doses.

Therapeutic Uses.—Quinine is extensively employed in periodical diseases of a malarial origin, such as intermittent fever, neuralgia of various forms, as enteralgia, hepatalgia, nephralgia, gastralgia, sciatica, angina pectoris, and in cases of debility, pneumonia, pleurisy, endocarditis, pyæmic, erysipelas, puerperal fever, cerebro-spinal meningitis, eruptive fevers, etc., etc., but the most important use of quinia is for the treatment of malarial diseases.

Dose.—Of sulphate of quinine, gr. j to ℈j, in aromatic water, by the aid of aromatic sulphuric acid, and also as an enema, or hypodermically. Pills may be made by combining 24 grains of sulphate of quinine with 24 grains of clarified honey, and dividing into 24 pills. Pills can also be made with glycerine.

Dental Uses.—Sulphate of quinine is internally employed in dental practice in reducing inflammation of the peridental membrane when resorted to in the early stages of the disease, and before effusion of inflammatory products, cell proliferation and escape of the white blood corpuscles have occurred; also, in hypersensitiveness of dentine—three or four grain doses every four hours, until thirty grains have been taken (Klump). The treatment of facial and other neuralgic affections, especially when of malarial origin, in cancrum oris, for its tonic and stimulant effects, in aphthous ulcerations of the mouth and in scurvy, where the system is much debilitated, and externally as an ingredient of dentifrices, for its tonic and stimulating properties.

DENTAL FORMULÆ.

For Facial Neuralgia from Dental Disturbance.

BARRETT.

℞ Ferri et quin. (cit) . ℥ij
Syrup aurantii . . . ℥j
Aqua dest. . . . . ℥j
Elixir calisayæ. . . . ℥ij. M.
SIGNA.—Coch. parv. ter in die.

For Neuralgia Associated with Anæmia.

GARRETSON.

℞ Tinct. ferri chloridi . ℥j
Quininæ sulphatis . . ℥j. M.
SIGNA.—Teaspoonful four times daily.

For Neuralgia from Dental Disturbance.

L. DE L. GORGAS.

℞ Quininæ sulphatis . gr.x
Ferri sulphat. exsic. . gr.v
Acidi arseniosi . . . gr.ss
Ext. nucis vomicæ . gr.v M.
Ft. pil. No. xx.
SIGNA.—One pill every four hours

For Acute Periodontitis.

℞ Quininæ sulph. . . . ℥ss
Acidi sulph. aromat. ℥ij
Elix. calisaya bark . ℥xiv. M.
SIGNA.—A tablespoonful every two or three hours.

For Acute Alveolar Abscess or Periodic Supra-orbital Neuralgia.

CASSIDY.

℞ Quiniæ sulphatis . . . . . gr. xv.
Ft. capsules No. 5.
SIGNA.—Take one every two hours.

RESORCIN.

Derivation.—Resorcin is a chemical compound of the phenol group and aromatic series, to which carbolic acid belongs. It is obtained from certain resins by the action of fusing alkalies, and is in the form of tabular, prismatic, shining, colorless or pinkish crystals, somewhat sweetish to the taste, followed by a slight pungency. Resorcin is very soluble in 0.6 part of water, and in 0.5 part of alcohol; ether, glycerine and vaseline; chloroform and carbon sulphide will not dissolve it. It darkens on exposure to the air, and is phosphorescent when rubbed in the dark. Its odor is somewhat similar to that of phenol, but not so strong.

Medical Properties and Uses.—Resorcin acts somewhat similar to quinine, although it differs from the latter in its lethal effects. Quinine, carbolic acid, and salicylic acid promote its effects; atropine antagonizes it. Through its action on the nervous system it greatly increases in frequency the respiration, which becomes convulsive and spasmodic, and afterward weak, but rapid. It also increases the action of the heart, causes the pulse to become weak and irregular. It is eliminated by the urine quite rapidly. It has no irritating action on mucous membranes.

Therapeutic Uses.—Resorcin, on account of its less irritating property, is considered preferable to carbolic acid for internal use and subcutaneous injection. It is employed internally in catarrh of the stomach, ulceration, gastralgia, fermentativeind igestion, fevers, for its antiseptic and antipyretic actions, and ulcerative endocarditis, etc., etc. Locally, on account of its antiseptic properties, in diphtheria, in syphilitic and other sloughing sores, and anthrax, in the form of crystals or powder, and in the form of spray in catarrhal and ulcerating affections of the nose and throat; in solution, on account of its antiseptic action, it is used for dressing putrid and atonic wounds, and is combined with water, glycerine and alcohol; it is also used in pomades.

A compound composed of resorcin and salicylic acid heated

together, is known as "Salicyl Resorcin-Ketone," and is antiseptic to a degree, as it limits the development of, rather than destroys, septic germs. It is soluble in glycerine and alcohol, and is neither poisonous nor disagreeable to the taste.

Dose.—Of resorcin, gr. v–xv. Five grains every two hours in an ordinary case.

Dental Uses.—Resorcin is a valuable antiseptic in dental practice, and may be applied with advantage in all cases where antiseptics are indicated. An antiseptic mouth-wash may be made of a two per cent. solution in water. A ten per cent. solution of resorcin is recommended in cases of chronic alveolar pyorrhœa (after cleansing the pockets with peroxide of hydrogen) where there is impaired circulation of the tissues. (See Antiseptic Uses of Carbolic Acid.)

DENTAL FORMULÆ.

For Alveolar Pyorrhœa.
DR. A. W. HARLAN.

℞ Resorcin . . . . . ℥ij
Acidi carbolici . . . ℥j
Glycerini . . . . . ℥iij
Aquæ q.s. . . . . ℥viij. M.

SIGNA.—Use as a mouth-wash after removing all deposits, and the adjacent carious or necrosed bone.

A few drops of oil of peppermint or any other desirable oil may be added to the above.

For Alveolar Pyorrhœa.
DR. A. W. HARLAN.

℞ Resorcin . . . . . gr.xxx
Acidi tannici . . . . gr.v
Olei cassia . . . . . ♏x
Glycerini . . . . . ℥j
Aquæ destillatæ . . . ℥ij. M.

SIGNA.—Inject with a syringe into the remains of the pockets in the after-treatment.

For Mucous Patches of the Mouth.
DR. A. W. HARLAN.

℞ Resorcin . . . . . gr.xl
Aquæ destillatæ . . . ℥ss. M.

SIGNA.—Dry surface and paint with above.

To Sterilize the Mouth in Alveolar Pyorrhœa.

℞ Resorcin,
Boroi-glyceı ini . ää ℥js
Acidi nitrici . . . . ♏ij
Aquæ destil. . . . . ℥iij. M.

SIGNA.—Use on a pledget of cotton (borated) and whole mouth swabbed with it.

RHEUM—RHUBARB.

Source.—The root of *Rheum officinale.* It contains two acids, *rheo-tannic* and *rheumic*, a resin, *phæoretin*, and an acid, *chrysophan* or *chrysophani.*

Medical Properties and Therapeutic Uses.—Rhubarb possesses tonic and astringent as well as purgative properties. In small doses, as a tonic, it promotes the appetite and digestive power, and by virtue of the tannic acid it contains, is astringent. The purgative principle it possesses enables sufficient doses of rhubarb to act as a cathartic, producing stools which are of a yellowish-brown color, and soft, but not watery. It has no tendency to cause gastro-enteric inflammation. It is now classed among the cholagogues, as it increases the flow of bile and the intestinal secretions, which is due to phæoretin—rhubarb resin. Its coloring matter not only stains the stools, but also the perspiration, milk of nursing women, to which it gives a bitter taste and purgative principles, and the urine. It is employed with benefit in diarrhœa caused by the accumulation of undigested food in the intestines, hemorrhoids accompanied by constipation, dyspepsia with deficient biliary and intestinal secretions, the summer diarrhœa of children in the form of the aromatic syrup, and in catarrh of biliary ducts with jaundice; and the chewing of rhubarb root is beneficial in habitual constipation; its frequent use, however, is objectionable on account of the astringent after-effect, which in the rhubarb pill is remedied by the soap.

Dose.—Of *Extractum Rhei*—Extract of Rhubarb, grs. x to grs. xv. Of *Extractum Rhei Fluidum*—Fluid extract of rhubarb, ʒss to ʒi. Of *Pilulæ Rhei*—Rhubarb pills, each pill consists of grs. iij of rhubarb and gr. j of soap. Of *Pilulæ Rhei Compositæ*—Compound pills of rhubarb, consisting of rhubarb, aloes and myrrh. Dose, 2 to 4 pills. Of *Syrupus Rhei*—Syrup of rhubarb, ʒss to ʒij. Of *Tinctura Rhei Aromaticus*—Aromatic tincture of rhubarb, ʒss to ʒij. Of *Tincture Rhei Dulcis*—Sweet tincture of rhubarb, ʒss to ʒij. Of *Vinum Rhei*—Wine of rhubarb, ʒj to ʒss. Of *Pulvis Rhei Compositus*—Compound powder of rhubarb, a teaspoonful.

RHIGOLENE.

Derivation.—Rhigolene is a product of the distillation of petroleum. In its composition it is a hydrocarbon, and is destitute of oxygen, being extremely volatile and inflammable, and is the lightest of all liquids, with a specific gravity of 0.625. It is a petroleum naphtha, and boils at 65° F., and when perfectly pure

should be almost odorless; but it is difficult to procure any specimen that does not have the unpleasant odor of petroleum. It is colorless, and on account of its great volatility and inflammability requires to be kept tightly stoppered, in a cool place, The storage of large quantities, except in very secure places, is attended with considerable risk, and on this account it is somewhat difficult to procure it outside of the manufactories. It is dangerous to use it at night near a light.

Dental Uses.—Rhigolene is employed, like absolute ether, to produce local anæsthesia, by dispersing it in the form of spray, with the spray apparatus, being the most rapid in its congealing effects, and also the most easily controlled and convenient of all of the freezing mixtures. As a local anæsthetic and analgesic it has been employed in the operation of extracting teeth, by applying it, in the form of spray, to the parts about the tooth to be removed until a blanched surface of gum is produced. The spray of rhigolene is also applied to the gum over the root of a tooth affected with incipient periodontitis.

SALOL—PHENYL SALICYLATE.

Formula.—$C_{13}H_{10}O_3$.

Derivation.—Salol is obtained by the combination of salicylic acid and phenol, consisting of 60 parts by weight of salicylic acid and forty parts of phenol. It is a white, crystalline powder, insoluble in water, without odor and a sweetish taste; soluble in ten parts of alcohol and in ether, chloroform and oils; it is generally employed in alcoholic solution. In the system it becomes decomposed, yielding salicylic and carbolic acids in nascent forms.

Medical Properties and Therapeutic Uses.—Salol is antiseptic, germicide and antipyretic, and possesses less poisonous properties than either salicylic acid or carbolic acid alone; large doses of salol, however, cannot be administered without danger of phenol poisoning. It is accumulative, owing to its being absorbed and eliminated slowly, and hence poisoning by it may result owing to the carbolic acid which it liberates.

In acute and chronic renal diseases, salol is contra-indicated. It is employed internally in disorders of stomach, acute gastro-enteritis, tonsillitis, gonorrhœa, skin diseases, gleet, etc. Exter-

nally used, salol is an excellent dressing for wounds, ulcers, burns, erysipelas and skin diseases. Camphorated salol is highly recommended by Cuirllier in the treatment of otitis. It can be mixed with iodoform or iodol, and the action of both be had simultaneously.

Dose.—Gr. v. to ʒj.

Dental Uses.—Mixed with iodoform, aristol, or oxide of zinc, salol is successfully used for capping exposed pulps. It is also employed as a root-filling material by first drying out the root-canals with absolute alcohol and hot-air, then liquefying a little salol in a test-tube over a spirit lamp, and injecting some of the liquid by means of a warm hypodermic syringe to the apex of each root; it is then allowed to crystallize, when it becomes very hard. Dr. Burchard, in Kirk's Operative Dentistry, says that salol and paraffin are both manipulated in the same manner as root-canal filling materials, and that salol is better adapted to deciduous teeth than to the permanent teeth owing to its lack of permancy.

For Erythema.

DR. A. EICHLER.

℞	Saloli	ʒij	
	Zinci oxidi		
	Pulv. amyli	āā ʒiv	
	Lanoline	ʒj.	M.

SANDARACA—SANDARACH.

Source.—Sandarach is a resinous substance obtained from an evergreen tree—*Thuya Articulata*—which grows in the northern part of Africa. The gum is in the form of small, irregular, round and oblong tears, of a pale yellow color, sometimes brown, and more or less transparent, dry and brittle. It has a faint, agreeable odor, which is increased by warmth, and a resinous, somewhat acrid taste. It melts with heat, diffusing a strong balsam odor, and is inflammable. It is soluble in alcohol and ether, and slowly dissolves in warm oil of turpentine. It consists of three resins, varying in their relations to alcohol, ether and oil of turpentine. The *sandaracin* which remains after sandarach has been exposed to the action of ordinary alcohol is a mixture of two of these resins.

Uses.—Sandarach was formerly employed as a medicinal agent, and entered into the composition of various ointments and plasters, but its use is now restricted to such purposes as the composition of a varnish, ingredient of incense, etc. After the erasion of ink marks, its powder, if rubbed on such a surface, will prevent fresh ink marks from spreading.

Dental Uses.—In dental practice, sandarach, dissolved in alcohol, forms a varnish for coating the surface of plaster models, etc.; it is also used for checking secretions from the gums during the operation of filling teeth, either applied as a coating to the surface, or on bibulous paper saturated with it. It is also employed to saturate cotton to be used as a temporary filling in cavities of the teeth, for the protection of medicinal applications.

DENTAL FORMULA.

Transparent Sandarach Varnish.

℞ Gum sandarach . . . . . ℥v
Alcohol . . . . . qt.j.
Mix and digest over a moderate heat until the sandarach is dissolved.

SHELL-LAC—SHELLAC.

Source.—Lac is a resinous substance, obtained from several varieties of trees which grow in the East Indies, and particularly from the *Croton Lacciferum*, and two species of the *Ficus*. It is supposed to be an exudation from the bark, owing to the puncture of an insect belonging to the genus *Coccus;* it is also said to be the exudation from the bodies of the insects themselves. Several varieties are known in commerce, the most common being the *stick-lac* the *seed-lac.* and the *shell-lac.* Lac, in its crude state, consists of resin, coloring matter, and a peculiar principle, insoluble in water, alcohol and ethyl, and known as *lacin*, a little wax, and various saline matters in small proportion.

Uses.—It is slightly astringent, and has been recommended as an adhesive substance for dressing ulcers, wounds, etc., being used by simply spreading it on the bandages after it is dissolved in alcohol by a gentle heat. Shellac is prepared by melting the crude lac, straining it, and pouring it upon a flat, smooth surface

to harden. It is in the form of thin fragments of various sizes, from half a line to a line in thickness, and of a light and also a dark brown color, shining, hard, brittle and inodorous. It is insoluble in water, but freely soluble in alcohol, especially with the aid of heat. It is employed as a varnish. In dental practice its uses are the same as those of sandarach, but owing to the dark brown color of the solution, it is not so sightly, and does not make a transparent varnish.

DENTAL FORMULÆ.

For a Colored Varnish.

℞ Gum shellac . . . . ℥v
Alcohol . . . . . qt.j.
Mix and digest over a moderate heat until thoroughly dissolved.

For an Aqueous Varnish.

℞ Pulv. shellac . . . partes j
Sat. solut. boracis . partes ij.
Mix by shaking together; it will give a starch gloss.

Shellac may be dissolved without the aid of alcohol, by a saturated solution of borax in water. This, however, does not give a very strong solution. To prevent cracking when the shellac is dissolved in alcohol, add a little castor oil; if in water, add glycerine. Clear shellac varnish may be prepared by first making an alcohol solution of shellac in the usual way, and then adding a little benzole, and the mixture well shaken. In from 24 to 48 hours the fluid will have separated into two distinct layers, an upper alcoholic stratum, perfectly clear, and of a dark-red color, while under it is a turbid mixture containing the impurities. The clear solution is drawn off with a pipe, or may be decanted.

SILVER SULPHO-CARBOLATE—SILVER SULPHO-PHENATE.

Derivation.—Silver sulpho-carbonate is prepared from silver carbonate and sulpho-carbolic acid. It occurs in the form of white, prismatic needles, containing twenty-eight per cent. of silver. It must be protected from light and air to prevent it from splitting up into metallic silver and phenol

Therapeutic and Dental Uses.—It is said to possess valuable antiseptic properties, and to be preferable to nitrate of silver for such purposes as the latter agent is employed, on account of its non-corrosive action. Dr. Harlan speaks of it acting very well

in deep pyorrhœa pockets. It is soluble in water in three to ten per cent. solutions.

SODÆ PHENAS—PHENATE OF SODIUM.

CARBOLATE OF SODIUM—PHENOL SODIQUE.

Formula.—C_6H_5NaO.

Derivation.—Phenate or Carbolate of Soda is obtained by mixing one part of caustic soda with five parts of carbolic acid, and a small quantity of water, and evaporating the solution, the result being a saponaceous mass of acicular crystals of a light pinkish color, which are converted by the heat into a fluid of an oily consistence. It is freely soluble in creasote, carbolic acid and water.

Medical Properties and Action.—Phenate of soda is hemostatic, antiseptic and disinfectant.

Therapeutic Uses.—It is internally administered in the form known by the French name of *Phenol Sodique*, in doses of gtt. viij to gtt. x in a glass of water, in typhus and typhoid fevers, as a preventive of cholera, in plagues, cholera infantum, etc.; externally, it is a valuable styptic in local hemorrhage, and as a dressing for wounds, burns, chilblains, excoriations, varicose veins, venomous stings and bites, and as a disinfectant in throat affections, leucorrhœa, diphtheria, scarlatina, smallpox, ozæna, etc.

Dental Uses.—Phenate of soda is useful in dental practice, as an astringent and styptic in hemorrhage following the extraction of teeth, and to relieve the soreness of such an operation, as it promotes the rapid absorption of the extravasated blood, and the healing and hardening of the gums. It is applied on a pellet of cotton, or in solution with water, and acts as a sedative and antiphlogistic as well as a hemostatic, and has little or no escharotic action. For soft and spongy gums it forms an efficient gargle or mouth-wash, and can be employed for this purpose in its full strength, in the form of phenol sodique, or diluted with from one to twelve parts of water. When applied on cotton to an exposed and inflamed pulp, it relieves odontalgia. It is also employed in aphthous ulcerations of the mouth, and as a disinfectant in offensive breath, in the proportion of a teaspoonful to a glass of water.

DENTAL FORMULA.

Phenol Sodique.

℞ Pure melted carbolic acid . . . . . 5 parts
Solution of caustic soda, sp. gr. 1:332 1 part
Distilled water . . . . . 5 parts
Mix.

SODII BICARBONAS—BICARBONATE OF SODIUM.

SESQUICARBONATE OF SODIUM.

Formula.—$NaHCO_3$.

Derivation.—Bicarbonate of sodium is obtained by saturating the carbonate of sodium with carbonic acid. It is in the form of a white, opaque powder, freely soluble in 11.3 parts of water, and insoluble in alcohol, with a mild, slightly alkaline taste.

Medical Properties and Action.—Bicarbonate of sodium is antacid, alterative, lithontriptic, and from its mildness and non-irritating qualities is more pleasant to the taste and to the stomach than the carbonate. It is extensively used in the preparation of soda and seidlitz powders.

Therapeutic Uses.—Bicarbonate of sodium is internally administered in neuralgia connected with acidity of the stomach, cardialgia, flatulence and vomiting, dyspepsia, diarrhœa, diseases of the skin, albuminuria, calculous disease, etc. Externally in diseases of the skin of a scaly and papular nature, ecthyma, ring worm, and sprinkled over burns and scalds, and combined with an equal part of common salt, for stings of venomous insects.

Dose.—Of bicarbonate of sodium, gr. v to ʒj, in carbonic acid water, or with sugar and mucilage.

EFFERVESCING POWDERS.—*Pulveris Effervescentes* are composed of tartaric acid, gr. xxv, in one paper, and bicarbonate of sodium, xxx, in another paper.

Dental Uses.—Bicarbonate of sodium is employed in dental practice to relieve neuralgia of an acid origin, in which a full dose often proves very serviceable; in aphthæ of children it is often combined with a little rhubarb and proves very efficacious. Externally it instantly relieves odontalgia when a small portion of the powder is applied to the irritable pulp and properly secured. It is also useful for neutralizing the acidity of the oral

fluids, especially when such a condition is the result of pregnancy. It also forms an antacid ingredient in dentifrices. As a mouth-wash or gargle it is used freely in the form of a 9 per cent. saturated solution.

Dr. E. C. Kirk recommends a thick paste of sodium carbonate as a local sedative and obtundent of hypersensitive dentine, its application to be made to a dry cavity and repeated when necessary. In acute periodontitis, applied to the gums after a slight puncture, it will often afford speedy relief from the pain. As a chemical disinfectant and antiseptic, Dr. Leffmann considers sodium carbonate to be of great value in the treatment of devitalized teeth containing semi-putrescent pulps and food *débris*, to be followed by injections of warm water.

DENTAL FORMULA.

For Periodontitis, etc.

CARL SEILER.

℞ Sodii bicarb. . . . . ℥viij
Sodii bibor. . . . . ℥viij
Sodii benzoate . . . . . .
Sodii salicylate . . . . . āā gr. xx
Eucalyptol . . . . . .
Thymol . . . . . āā gr. x
Menthol . . . . . gr. v.
Ol. Gaultheria . . . . . gtt. vj
Glycerini . . . . . ℥viiiss
Alcoholis . . . . . ℥ij
Aquæ . . . . . q.s. 16 pints. M.

SIGNA.—Use as an antiseptic spray.

SODII BORAS—BORATE OF SODIUM.

BORAX.

Formula.—$Na_2B_4O_7 + 10H_2O$.

Source.—Borax is a native salt, but can be obtained artificially by boiling together native boracic acid (found in Italy) and carbonate of soda. California furnishes the borax used in this country. It is in the form of colorless crystals, which effloresce somewhat in dry air, and are freely soluble in water and glycerine, but insoluble in alcohol, with an alkaline reaction, and a sweetish alkaline taste. It dissolves fibrine, albumen, casein and uric acid.

Medical Properties and Action.—Borax is refrigerant, diuretic, detergent, antacid and emmenagogue, and has been employed as a solvent for calculi. It resembles in its action carbonate of soda, and by its mild alkaline qualities it improves the condition of the skin and mucous membranes. In excessive or large repeated doses it is injurious, causing nausea and vomiting, and a scorbutic condition of the body.

Therapeutic Uses.—Borax is internally administered in infantile diarrhœa, in the form of an enema; also, as a solvent for calculi, and in dropsy, etc., but its chief use is as an external application. Externally it is applied as a detergent in cutaneous affections, ulcerations, pityriasis, to remove freckles, to allay itching, etc., etc.

Dose.—Of borate of sodium, gr. ij to ℈j.

Glycerite of Borate of Sodium—Glyceritum Sodii Boratis—Glycerinum Boracis—is composed of borax, ℥ij; glycerine, Oss, and is a useful application to the mouth and throat.

Honey of Borate of Sodium—*Mel Sodii Boratis—Mel Boracis*—is composed of borax, ℥j; clarified honey, ℥j, and is also useful as a detergent application to the mouth and throat.

Boricine.—Boricine is a combination of equal parts of borax and boracic acid, forming a tetraborate of sodium, which is neither toxic, caustic nor irritant. It has no odor, and gives a saturated solution at 16 per cent. Mr. Emile Denis recommends boricine as a disinfectant of root canals, abscess of antrum, and diseased mucous membrane.

Dobell's Solution.—Sodium Borate, 7 1/2 grs.; sodium bicarbonate, 7 1/2 grs.; carbolic acid 1 1/2 grs., in the form of compressed tablets, one tablet may be dissolved in glycerine, 15 minims and water sufficient to make a fluid ounce; useful as a topical application in oral acidity, and catarrhal conditions of the mucous membrane.

Dental Uses.—Borax, mixed with sugar or honey, is a very useful application for aphthæ and other ulcerations of the mouth, for which it may be mixed with sugar in the proportion of one part to seven, or in the form of *mel boracis*. In mercurial stomatitis, an aqueous solution of borax, or the *mel boracis*, forms an efficient gargle. Borax is also a useful application in fissured or cracked tongue. Borax is also added to sage and balm teas, to

form gargles. A saturated 6 1/4 per cent. solution is efficient as a mouth-wash.

In the dental laboratory, borax is employed as a flux in melting metals, such as gold and silver, and in the process of soldering metals. It is also employed to harden plaster casts or models, the model being well dried and then immersed for a few minutes in a solution of borax in boiling water, which renders it, when cool, hard and durable. (Solutions of carbonate of soda and alum are used for the same purpose.) Dr. J. L. Williams considers borax a valuable application to the teeth of pregnant women to counteract acidity of the fluids of the mouth. He recommends the use of the powder applied to the teeth and allowed to remain half a minute or so, and then brushed off by a whirling motion of the brush, not with a horizontal movement. Also useful to sterilize instruments.

Impression trays may be perfectly cleaned, after using modeling composition, by boiling in sal-soda water.

DENTAL FORMULÆ.

A Mild, Detergent Gargle.

℞ Sodii boratis . . . . ℥j
Glycerini . . . . . ℥vj. M.

For Aphthous Ulcerations, Parasitic Formations, and Diphtheritic Conditions.

℞ Sodii boratis . . . . ℥ij
Syrupi aurantii . . ℥iv
Aquæ destillatæ . . . ℥iv. M.
SIGNA.—To be applied as a lotion or mouth-wash, stimulant and antiseptic.

For Aphthous Ulcerations, etc., etc.

℞ Sodii sulphitis . . . ℥j
Glycerini . . . . . ℥j. M.
SIGNA.—To be used as a lotion or mouth-wash.

For Fissured or Cracked Tongue.

℞ Sodii boratis . . . . ℈j
Glycerini . . . . . ℥j. M.
To be used as a lotion or gargle.

For Fissured Tongue.

J. W. WHITE.

℞ Sodii boratis . . . . gr.xl
Glycerini . . . . . ℥j
Aquæ destillatæ . . . ℥iv. M.
To be used as a gargle

A Detergent Alkaline Gargle.

℞ Sodii boratis . . . . ℥iv
Glycerini,
Tincturæ myrrhæ . ää ℥ss
Aquæ destillatæ . . . ℥x. M.

Mouth-wash for Infants.

DR. GEO. H. WRIGHT.

℞ Borax . . . . . gr. 30
Sodium bicarbonate ℥j
Distilled water . . . ℥iv

Collyrium.

DR. POTTER.

℞ Sodii boratis . . . . . gr. x
Aquæ camphoræ . . . . . ℥ij
Mucil. cydonii . . . . . .
Aquæ destillatæ . . . . . āā ℥ss. M.
Fiat collyrium.

SIGNA.—Eye-water: A few drops put into the eye 3 or 4 times daily.

SODII SALICYLAS—SALICYLATE OF SODIUM.

Formula.—$2NaC_7H_5O_3 + H_2O$.

Derivation.—Salicylate of Sodium is prepared by the addition of salicylic acid to a solution of bicarbonate of sodium; when the latter is in excess the solution is brownish or purplish in color, and has a strong odor of wintergreen. The formula is as follows: ℞. Acidi salicylici, ℥ij; sodii bicarb., ℥j; aquæ, ℥ij. M. It is soluble in 0.9 part of water and in six parts of alcohol, it is also soluble in glycerine.

Dose.—A teaspoonful, every 2, 3 or 4 hours.

Dental Uses.—Employed as an internal remedy for odontalgia, periodontitis and the pain of carious dentine, affording temporary relief for several days. Dr. Thomas recommends doses of ten grains every half hour for the relief of odontalgia.

For Aphthous Stomatitis.

℞ Salicylate of soda . . . . . 20 parts
Distilled water . . . . . 100 parts dissolve.

SIGNA.—Paint the inflamed parts five or six times a day, particularly after meals. The mouth should previously be well rinsed out with tepid water.

For Aphthous Patches.

DR. GEO. H. WRIGHT.

℞ Sodium salicylate . . . . . gr. 75
Sodii boratis . . . . . gr. 45
Tincturæ Myrrhæ . . . . . ℥j
Aquæ destillatæ . . . . . ℥ss.

SODII SULPHIS—SULPHITE OF SODA.

Formula.—$Na_2SO_3 + 7H_2O$.

Derivation.—Sulphite of Soda is prepared by passing sulphurous acid into a solution of carbonate of soda, and evaporating

free from air. The sulphurous acid unites with the soda of the carbonate, to form the sulphite of soda, and the carbonic acid escapes. On cooling, the salt crystallizes in white prismatic crystals, and should be kept well stoppered, as it changes on exposure into sulphate of soda.

Medical Properties and Action.—Sulphite of soda is a disinfectant and deodorizer, and its action and uses are similar to those of the other sulphites, hyposulphites and sulphurous acid.

Dose.—Of sulphite of soda, gr. xv to ʒj, three times a day.

Dental Uses.—Sulphite of soda is sometimes employed in the form of a lotion for aphthous sore mouth due to a parasitic vegetable; also in ulcerous stomatitis, gangrenous stomatitis, and all suppurative affections of mucous membrane, especially when they are sustained by zymotic influences or invisible organisms. Dr. E. C. Kirk has successfully employed sulphite of soda in combination with boracic acid, for bleaching discolored teeth. (See formula.) His method is as follows:

Having adjusted the rubber dam to the tooth to be treated, and one adjoining it on each side, the cavity of decay is cleansed of all *débris* and the root filled with gold or gutta percha for one-half its length. The powder, composed of sulphite of soda and boracic acid, is packed into the remaining portion of the pulp-canal and cavity of decay, leaving just sufficient space to insert a temporary filling of gutta percha or Hill's Stopping. After the powder has been properly packed, a drop of water is permitted to fall upon it from a drop-tube or a pellet of cotton wrapped around a broach, the object being to dampen the powder, not to wash it out. The cavity of decay is then filled with gutta percha, and the patient dismissed until the next sitting, when a second application can be made, which is usually sufficient, except in cases where the walls of the tooth are very thick and much discolored, when a third application may be necessary. When the water is added to the powder a chemical reaction takes place, the boracic acid unites with the sodium of the sulphite to form sodium borate, at the same time liberating the sulphurous acid, upon which the bleaching power depends. Dr. F. D. Weisse recommends hyposulphite of soda for abscess of the antrum, the following solution being injected at least five times a day. Sulphite of soda, one drachm to one ounce of water.

DENTAL FORMULÆ.

For Aphthous Sore Mouth.

℞ Sodii sulphitis . . . ʒj
Aquæ . . . . . fʒj. M.
SIGNA.—Apply as a lotion.

For Same.

DR. WALLACE.

℞ Sodii sulphitis . . . gr.xxx
Glycerinæ,
Aquæ . . . . . āā ʒss
SIGNA.—To be used on a swab every two hours.

For Bleaching Discolored Teeth.

DR. E. C. KIRK.

℞ Sodii Sulphitis . . . . . gr. 100
Acidi boracis . . . . . gr. 70
Mix by grinding together in a warm, dry mortar, to a fine powder, which is preserved in an air-tight stoppered bottle, and kept in a dry place.
SIGNA.—(See Dental Uses of Sulphite of Soda.)

SODIUM SILICO-FLUORIDE.

Derivation.—When sand is fused with sodium or potassium carbonate, a reaction occurs forming a silicate of these metals, $SiO_2 + Na_2CO_3 = Na_2SiO_2$ (sodium silicate) + CO_2. The silicates of sodium and potassium are commonly known as *water-glass*, and are soluble in water, whereas silicates of other metals are generally insoluble. When a mixture of fluor-spar and any silicious substance, as sand, is heated in a retort with H_2SO_4, the resulting gas being distilled over through mercury into water, which holds it in solution, and which is then filtered to remove the free silicon which precipitates, the result is hydro-fluosilicic acid.

Medical Properties and Therapeutic Uses.—Sodium silico-fluoride, in the form of a white powder, is antiseptic, disinfectant and styptic. Experiments with this salt by Mr. Wm. Thomson, F. B. F. C., F. C. S., show that the compounds of fluorine are powerful disinfectants, and of these the sodium silico-fluoride is the most serviceable. It has been employed as a substitute for peroxide of hydrogen on account of the changeable nature of the latter agent. Even in a saturated solution, sodium silico-fluoride is not an escharotic coagulant, but it is a slight irritant in such a form, which is not a positive disadvantage in the

treatment of some affections, such as alveolar pyorrhœa for example.

Dental Uses.—Sodium silico-fluoride has been used with good results in cases of putrescent pulps, chronic alveolar abscesses, pyorrhœa alveolaris. Also as a deodorizer in pulp-canals by destroying the putrescent hydrogen. As a disinfectant, it is powerful enough, even in weak solution to antagonize, in a marked degree, the germs of putrefaction; as a coagulant, it is non-escharotic; as a deodorant, it is strong enough to destroy the most penetrating of putrefactive odors; as a stimulant, it is powerful enough in full solution to bring about the formation of new tissue-and not act as an irritant to surrounding tissue; it is comparatively unchangeable. Such properties may render it one of the most useful salts in the dental pharmacopœia.

SOMNOFORM.

Derivation.—Somnoform is a mixture of 60 per cent. of ethyl chloride; 35 per cent. of methyl chloride, and 5 per cent. of ethyl bromide. The liquid has the odor of onions, a pungent one, not very pleasant. The gas is very volatile, as the moment the liquid comes in contact with the air it becomes a gas. It was first brought into notice in 1901 by Dr. Roland, of the Paris Municipal Hospitals. In somnoform there is no rule laid down as to the quantity, administration, and recovery.

Medical Properties and Action.—It is claimed for Somnoform that it produces anæsthesia without acting primarily on the cerebellum and secondarily on the cerebrum, and has no preference for the cerebral covering. Not being caustic, it does not irritate the mucous membrane. It is also claimed that with Somnoform complete anæsthesia is obtained in less than half the time as with nitrous oxide gas, and that the anæsthesia continues for a much longer time, and is of a quiet nature if the patient is in a normal condition, and causes no jactitation of the lower limbs when administered to children. It cannot, however, be said that no accident can happen in the administration of Somnoform, hence as many precautions should be observed in its use as in that of other anæsthetics. Somnoform usually takes from 20 to 35 seconds to bring the patient under a full narcosis, and the duration of the anæsthesia is from 1 to 3 minutes; but Dr. M. M.

Frieland states that the after-results, as nausea, headache, and depression, are far above the percentage as compared with N_2O. Some use Somnoform on nervous patients for its quick action, as they become anæsthetized before they realize what has occurred. The purest form of Somnoform is that contained in the small, sealed tubes. The most reliable sign of complete anæsthesia is muscular relaxation and the absence of the conjunctival reflex. Dr. Friedland elicits the former by instructing the patient to have the fingers of both hands interlocked in front of the chest, and when anæsthesia is complete the hands will relax and drop to the sides. Concerning conjunctival reflex Dr. Friedland also says the best method is to separate the eyelids and blow in the eye, and when no reflex takes place, as a rule the patient is fully anæsthetized.

Dose.—The general dose of Somnoform is about 3 to 5 c.c. or ℥ 3/4.

Dental Uses.—Somnoform is used as a general anæsthetic for dental and minor surgical operations, and is furnished in sealed glass tubes or capsules containing 3 cubic centimeters (or 3/4 of a fluid drachm), which is the dose for one administration. The inhaler used consists of a glass mask having on one side a metal box which opens by means of a spring being touched when the lid flies back and exposes two metal bars placed there to facilitate the breakage of the glass capsule. The hermetic adaptation of the glass mask to the face is obtained by a pneumatic rubber band of two sizes, one for adults and one for children. At the other end of the mask is fitted a rubber bag, or a sterilized bladder which answers as an air receiver. A lint diaphragm is fixed inside the mask on which the anæsthetic can be sprayed; the lint prevents the ends of the broken glass capsule which contained the Somnoform from escaping into the mouth. The excess of Somnoform when sprayed into the mask is absorbed by the lint prior to its evaporation. The patient appears to be aware of what is going on without feeling any real pain; the sense of hearing is the first to be lost, and also the first to be regained on recovery; during the period of induction the patient experiences a feeling of anxiety which he is powerless to combat; and shortly after the inhalation begins there is a loss of estimating time, and any act whatever seems to take up five or perhaps ten

minutes longer than is actually the case; when returning to consciousness, the patient seems for a time unable to recognize his surroundings.

Ninety per cent. of the patients, it is claimed, remain quiet during the administration of Somnoform, and only ten per cent. show restlessness or have involuntary micturitions during the anæsthesia; the excited patients, it is said, are confined to those addicted to the use of tobacco, alcohol, etc., also epileptics and hysterical patients. On April 23, 1906, a death occurred following the administration of Somnoform in New York City. The patient was an overtrained athlete and a post-mortem examination showed a marked hypertrophy of the heart walls.

SOZOIODOL.

Sozoiodol contains 53 per cent. of iodine, and is antiseptic and disinfectant, and is a much better prepared combination than that first prepared under this name. It is employed in the form of a five per cent. watery solution, in powder, and also in a form known as zinc-sozoiodol in the strength of a two per cent. solution.

Therapeutic Uses.—Sozoiodol is valuable as an antiseptic and disinfectant in the treatment of unhealthy wounds, pharyngeal catarrh, acute purulent conjunctivitis, and other diseases of the eyes. The powder has been successfully used in catarrh of the cervix uteri, and the zinc-sozoiodol in urethritis, and vaginitis; also in eczema and impetigo.

Dental Uses.—Sozoiodol is employed with advantage in the acute forms of stomatitis, and other conditions of the oral mucous membrane, also in unhealthy or contaminated wounds of the mouth in the form of a watery solution or powder.

STROPHANTHUS—STROPHANTHUS HISPIDUS.

Source.—Strophanthus is derived from the climbing plant strophanthus hispidus (Apocynaceæ) of western Africa, from the extract of which the arrow-poison Kombé is made by the natives. The active principle is *Strophanthin*, from which *Strophanthidin* is derived by the action of sulphuric acid. Strophanthin is a crystallizable glucoside, common to different parts of the plant, but especially in the seeds which yield a large proportion.

Medical Properties and Therapeutic Uses.—Strophanthin is bitter, acidulous, insoluble in ether and chloroform, but soluble in alcohol and water. It is a local anæsthetic, as three or four drops of a solution of 1 to 1000 dropped into the cornea will anæsthetize it for one or two hours without any irritation of the conjunctiva. It is considered by some to be a more powerful local anæsthetic than cocaine. The sensation of heat and cold is the last to be overcome, and the first to revive. Strophanthus is a cardiac tonic, in its action resembling digitalis. It lessens the heart's action, lengthens the intervals between the contractions, and increases the energy of the muscular tissue. In fatal cases the heart's action is arrested in diastole. It may be used to fulfill the same indications as digitalis, and is quicker in action and less protracted, but is considered to be less certain. It is less irritating and more prompt when used hypodermically than digitalis. It is a very powerful drug. It is also to some degree a diuretic, and the prolonged use of strophanthus will sometimes cause diarrhœa. Besides its employment as a local anæsthetic it is administered in cardiac dropsy, as a cardiac stimulant in typhoid fever, also in angina pectoris, bronchial asthma, whooping-cough, etc.

Dose.—Of the tincture—*tinctura strophanthi* (5 per cent.), ♏ ij to x; of strophanthin, gr. 1/1000 to 1/60. Strophanthin may also be administered hypodermically in doses of gr. 1/100, not more than once daily.

Dental Uses.—Strophanthin is employed in dental practice as a local anæsthetic and obtunder of hypersensitive dentine. As a local anæsthetic it is usually combined with cocaine, atropine, some of the essential oils, and glycerine.

DENTAL FORMULA.

For Local Anæsthesia.

DR. BIRGE.

℞ Strophanthin . . . . . gr. 1/5
Sulphate atropin . . . . . gr. 1/2
Carbolic acid (95 per cent. sol.) . . . gtts. v
Hydrochlorate of cocaine . . . . . grs. xx
Distilled water . . . . . q. s. f℥j. M.

SIGNA.—Inject 4 to 6 drops hypodermically.

SULFONAL—SULPHONAL.

Formula.—$C_7H_{16}S_2O_4 = (CH_3)_2 : C:(SO_2C_2H_5)_2$.

Sulfonal is in the form of colorless prisms, odorless and tasteless. It is easily soluble in hot water and in alcohol, and but slightly soluble in 100 parts of cold water, and is soluble in 18 to 20 parts of hot water, and melts at 258° F.; it is also soluble in alcohol and ether; it is not affected by any of the ordinary acids. It appears to possess hypnotic properties of considerable power, and is regarded as prompt and reliable, producing a quiet, natural sleep, lasting a number of hours. It appears to have no unfavorable effects on the heart or the circulation, nor on the temperature, the pulse or the respiration, and to produce no disagreeable secondary symptoms, nor to interfere with the process of digestion.

It is best administered in hot liquids, such as a bowl of soup or broth, a cup of milk, tea, coffee, cocoa, in capsules, or in acacia mucilage, etc.

Medical Properties and Physiological Action.—The conclusions drawn by Mathes are as follows: 1. Sulfonal is a useful hypnotic agent, though it is not always efficacious. 2. It has the advantage over other agents of having no odor or taste, and no influence on the essential organs of life. 3. The worst of its disagreeable effects are insignificant. 4. The dose depends upon the individual susceptibility, and is therefore variable. Generally a gramme is sufficient to cause sleep without accessory manifestations. When these are produced the dose should be diminished. On account of its slow action, it should be given at least an hour before the time for sleep. 5. When the insomnia is due to irritating cough or to pains not clearly neuralgic, the use of sulfonal is contra-indicated. In most true neuralgias, on the contrary, it may be used with benefit. Sulphonal should be used 2 or 3 hours before the patient retires.

It is a valuable remedy for persistent neuralgia in doses of gr. x–xxx; it may be administered in hot liquids, such as tea, in the form of tablets of five and fifteen grains. Sulphonal is regarded as being safer than chloral.

Dose.—Grs. v to grs. xv; but variable, depending upon the individual susceptibility.

Although sulphonal is probably one of the safest, as it is one of the most efficacious among the recent hypnotics, the series of cases published by Bresslaur, of Vienna, show clearly that it has certain dangers. Out of seventy-seven feeble lunatic patients who were treated with this drug, no less than seven showed serious symptoms, and in five or these there was a fatal termination; but it should be stated that the patients had been taking the drug for a considerable time in good doses, and had borne it well until symptoms of disturbance appeared, such as great constipation, dark-brown urine, slow but in some cases rapid but feeble pulse, discolored patches resembling purpura on the limbs, and great prostration. In the cases which ended fatally, the cause of death was heart-failure, with œdema of the lungs. A number of fatal cases of acute and chronic poisoning from sulphonal are recorded. Sulphonal should not be used continuously for more than a few days.

Dental Uses.—Dr. Chase recommends sulphonal very highly for nervous patients after a protracted dental operation, as a small dose will give a quiet night's rest.

Trional is a crystalline hypnotic, $C_8H_{18}S_2O_4$, and is used like sulphonal. It is safer in its action than chloral, but slower, and is more soluble than sulphonal. *Dose* gr. 15–30.

TERCHLORIDE OF PHENOL.

Derivation.—Terchloride of Phenol has recently been introduced as a disinfectant and antiseptic. It is prepared by passing a stream of chlorine gas through chemically pure carbolic acid, previously melted, until it acquires a violet hue. When carbolic acid is acted upon by chlorine gas a number of compounds are produced; such as a monochloride, a bichloride and a tri- or terchloride of carbolic acid (phenol).

Medical Properties and Action.—It is not an irritant, and has no acid reaction.

Therapeutic and Dental Uses.—Terchloride of phenol is claimed to be a valuable antiseptic and disinfectant in the treatment of gangrenous ulcers, etc. In dental practice it has been very recently recommended in combination with iodoform, as a material for capping exposed pulps and as a filling for root-canals of teeth, and the advantages claimed for it are, that it will be

reabsorbed when in contact with living tissues; it is easily introduced into pulp-canals; it absorbs exudations; it becomes hard when mixed with certain chemical substances, but is destroyed by pus; it is a very bad conductor of heat; and it is absolutely a non-irritant. The method recommended for its use as a capping and filling material is, to incorporate iodoform and terchloride of phenol with decalcified dead bone, as follows: dead bone or ivory shavings are decalcified in a ten per cent. solution of chemically pure hydrochloric acid, and after all the lime salts are extracted, the residue is collected upon a filter, washed, dried and rubbed to a fine powder in a porcelain or glass mortar. Upon this powder ten times its weight of a ten per cent. solution of iodoform in sulphuric ether is gradually poured and constantly rubbed until a fine yellow powder is obtained, which contains about fifty per cent. of iodoform. When used as a capping for pulps, or a filling material for root-canals of teeth, this powder is made into a paste by the addition of carbolic acid or terchloride of phenol, being worked or rubbed together like ordinary cement. For hyperæmic conditions of the dental pulp success has attended the application of a cap of the iodoform and decalcified bone paste mixed with terchloride of phenol. For inflamed pulps the application of terchloride of phenol is to be repeated every third or fifth day, until no more pain is felt, and the pulp is then to be capped with the decalcified bone, iodoform and terchloride of phenol material, and a temporary filling introduced into the crown cavity. The treatment of ulcerated and gangrenous pulps of the teeth consists in treating with the terchloride of phenol, and after the second or third application, if no trouble occurs from a temporary closure of the root-canals, to fill with the decalcified bone, iodoform and terchloride material, using whalebone instruments for its introduction, until congelation is occasioned, and the congested condition of the capillaries of the part relieved, acting as a counter-irritant and antiphlogistic.

TEREBINTHINA—TURPENTINE.

Source.—The concrete oleo-resin of *Pinus australis* and various species of pine.

Oleum Terebinthinæ.—Oil of Turpentine obtained by distillation.

Formula.—$C_{10}H_{16}$.

Oil of Turpentine is a limpid, volatile, colorless oil, with a hot pungent taste and a strong peculiar odor. It is slightly soluble in water. In small doses it increases the action of the heart, elevates the arterial tension and causes a sense of warmth and exhilaration; it does not coagulate albumen, and is used to sterilize instruments and also to disinfect the skin.

In large doses it causes thirst, fever, vomiting, weakness and a species of intoxication. In poisonous doses there is complete muscular relaxation, insensibility, flushed face, dilated pupils, labored and stertorous breathing. It stimulates the vaso-motor system, and has marked antiseptic properties, arresting fermentation and putrefaction, and destroying micro-organisms. Inhalation of the vapor of turpentine causes headache, nasal and bronchial irritation, ecchymosis of the air-passages, hyperæmia of the kidney and congestion of the lungs.

The ozonized oil of turpentine is an antidote to phosphorus, by the power it possesses of converting the agent into an insoluble substance; and a vial of turpentine worn about the neck is said to prevent necrosis of the jaw and steatosis in workmen using phosphorus in manufactories.

Sanitas is a highly ozonized preparation of turpentine, and is used as an antidote to phosphorus poisoning. (See oil of Sanitas.)

Oil of turpentine is employed in flatulence, colic, chronic intestinal catarrh, constipation and as an anthelmintic; also in passive hemorrhages from mucous surfaces, tænia and as a stimulant in low fevers. In the form of enemata for colic, tympanitic distention and impaction of fæces, etc.; in the form of liniment for myalgia, neuralgia, lumbago, etc.; also for burns, erysipelas and chilblains.

Terebinthene ($C_{10}H_{16}$) is a hydrocarbon formed by the distillation of turpentine with an alkali. Terebinthene is converted by hydration into a solid crystalline body, known as *terpine;* and terpine is converted into *terpinol* by an acid. *Terebene* is derived from turpentine by the action of sulphuric acid. These derivations are used in bronchitis, broncho-pneumonia, asthma, etc. In dental practice *terpinol* is employed as an antiseptic, disinfectant and sterilizer.

Dose.—Oil of turpentine, ♏v to ℥ss; of terebinthene-terpine, gr. v to gr. xx; of terpinol, gr. ij to gr. v; of terebene, ♏v to xx.

Linimentum Terebinthinæ.—Liniment of Turpentine is composed of oil of turpentine thirty-five parts and resin create sixty-five parts.

Oil of Sanitas—Oleum Sanitas—is obtained by the oxidation of oil of turpentine floating on water, by directing a stream of heated air on its surface. Sanitas oil is an antiseptic and disinfectant, possessing considerable oxidizing power. It is non-irritant and non-poisonous, and its odor is similar to that of fresh pine. The oils of cinnamon, gaultheria and sassafras will disguise its odor. In dental practice, the oil of sanitas has been very successfully employed in alveolar pyorrhœa, alveolar abscess, diseases of mucous membrane, exposed pulps, abscess of the antrum, foul ulcers, wounds and ulcerated sore throat; also as a protection against phosphorus poisoning and phosphor-necrosis of the jaw.

The oil of turpentine is employed as a styptic in dental hemorrhage, applied on cotton after the loose clot is removed, and the cavity thoroughly washed out with hot water. For hemorrhage following the removal of single root teeth, it is recommended to wrap the root of the extracted tooth with a few shreds of cotton saturated with oil of turpentine and return it to its cavity.

Oil of turpentine is also employed as a sterilizer of surgical and dental instruments, gauze, bandages, towels, etc. The method, which is simple, consists in placing the oil of turpentine in flat, large-mouthed bottles at the bottom of each case or drawer, the volatility of the agent causing the vapor to impregnate the surrounding air.

Sanitol.—A new preparation in which are embodied formol and salitrol, coal-tar derivatives. It is non-irritating and possesses antiseptic properties. It is recommended as the basis of a dentifrice which is said to contain no soap, acid or alkali.

The formula is Salitrol, Formol, Boracic acid, Plantago majorum, Menthol and Spirits of Cologne. It is claimed to be a pleasant antiseptic dentifrice.

For Dental Hemorrhages from Constitutional Vice.

MR. SALTER.

℞ Vitelli ov. . . . . ℥ij
Olei terebinth. . . . . ℥jss
Tinct. ferri ses chloride . . . . . ℥iij
Sacchari . . . . . ℥ij
Aquæ . . . . . ℥viij. M.
Dose: A teaspoonfull every hour.

THYMOL.

Formula.—$C_{10}H_{13}(OH)$.

Derivation.—Thymol, or thymic acid, is obtained from the herb *thymus vulgaris*, or common thyme, which is cultivated in this country for the same purposes as sage, lavender, etc. Thyme yields a volatile oil, *oleum thymi*, from which thymol or thymic acid is obtained by treating the oil with an aqueous solution of potassa or soda, which separates it from a principle called *thymene*, with which it is mixed in the oil, and which is not affected by the alkalies. The thymate thus formed is decomposed by an acid, and the liberated thymol, or thymic acid, is purified by repeated washings, desiccation and distillation. Thymol is in the form of aromatic white crystals, soluble in one thousand parts of hot water.

Medical Properties and Action.—In a concentrated state, thymol has an acrid and caustic taste; but when very much diluted, the only taste experienced is that of thyme.

Thymol has acrid properties, and s similar in its action to carbolic acid. It imparts a sense of coolness to the mouth, like that of oil of peppermint, and when once melted it remains indefinitely in the liquid state.

While it is soluble in 1200 parts of water, it is freely soluble in alcohol, and is dissolved by ether and the fixed oils. The alkalies unite with it to form soluble salts. Like creasote, it has the property of combining with animal tissues, and thus prevents putrefaction. While it has the important practical properties of carbolic acid, it is free from disagreeable odor, and it is claimed to be as efficient an antiseptic as that agent.

Therapeutic Uses.—Thymol is almost exclusively employed as an external application, and is often substituted for the oil of

origanum, which is obtained from the common marjoram. It is considered to be a valuable antiseptic and antifermentative agent.

Dental Uses.—Thymol, when combined with glycerine, in a form known as *Glycerole of Thymol*, is a valuable antiseptic in the treatment of suppurating pulps of teeth, as a dressing for ulcers of the mouth, wounds, etc.; also in the treatment of teeth after the devitalization of the pulp, chronic inflammation of the pulp, and alveolar abscess, as it arrests the putrefactive process; also in stomatitis and abrasion of mucous membrane. Hartmann recommends sprinkling crystallized thymol on an exposed (not bleeding pulp), to relieve the pain of pulpitis.

Oil of Thyme—*Oleum Thymi*—is distilled from the leaves and flowers of *Thymus vulgaris*, and is a reddish or yellowish liquid, which in time and on exposure becomes darker and thicker; it is soluble in one-half its volume of alcohol. It is used as an antiseptic.

DENTAL FORMULÆ.

Glycerole of Thymol.

℞ Thymoli (cryst.) . . gr.xx
Glycerini,
Alcoholis . . . . āā f℥j
Aquæ destillatæ . . . Oj. M.

For Alveolar Abscess, Suppurating Pulps, etc.

Alvin.

℞ Thymoli (cryst.) . . ptm.j
Iodi . . . . . ptm.j
Potassii iodidi . . . ptm.j.
Glycerini . . . . pts. v to xv.
Signa.—Apply as in use of carbolic acid.

For Stomatitis.

Alvin.

℞ Thymoli (cryst.) . . ptm.j
Glycerini pts.100
Signa.—To be used as a lotion and gargle.

For an Antiseptic in Suppurating Pulps, Alveolar Abscess, etc.

℞ Thymoli (cryst.) . . ptm.1
Glycerini . . . . pts. ij to iv.
Signa.—Applied in the same manner as carbolic acid.

Antiseptic and Germicide Mouth-wash.

W D. Miller.

℞ Thymoli . . . . . grs.iv
Acidi benzoici . . . grs.45
Eucalyptol . . . . ℥3 1/2
Alcoholis . . . . . ℥25
Olei gaultheriæ . . gtt. 25. M.

An Antiseptic Gargle.

℞ Thymoli . . . . . 3 1/2 grs.
Acidi benzoici . . . 45 grs.
Tinct. of eucalypti . . 180 grs.
Aquæ . . . . . Oij. M.
Signa.—After cleansing the teeth, use as a gargle for half a minute or a minute

Antiseptic Fluid.

VOLKMANN.

℞ Thymoli . . . 1 part
Alcoholis . . . 10 parts
Glycerini . . . 20 parts
Aquæ . . . . . 100 parts. M.

SIGNA.—Apply as a lotion

For Stomatitis.

DAVID.

℞ Thymoli . . . . . gr.vij
Boracis . . . . . gr.xv
Aquæ . . . . . ℥iss. M.

SIGNA.—Use as a tonic and antiseptic mouth-wash, by placing a few drops in a wineglass of warm water.

For Fetid Breath from Deposits about Tonsils and Gums.

DAVID.

℞ Sodii Boracis . . . gr.xv
Alcoholis . . . . . ℥ss
Thymoli . . . . . gr.vij
Aquæ . . . . . Oj. M.

SIGNA.—Use as a mouth-wash.

Antiseptic Mouth-wash.

DR. W. D. MILLER.

℞ Thymoli . . . . gr.ij
Acidi benzoici . . gr.xivj
Hydrarg. bichlor. . gr.ix
Tinct. eucalpyti . ℥ss
Olei peppermint . gr.xj
Alcoholis . . . . ℥xxvj. M.

Filter and add sufficient of the solution to a wineglass of water.

SIGNA.—Rinse with this mixture twice sufficiently to sterilize mouth.

For a Nerve Paste.

DR. S. H. MCNAUGHTON.

℞ Thymoli . . . . . gr.xxiv
Camphoræ . . . . . gr.xij
Acidum arseniosum gr.iij. M.

If much pain follows the application of the above, apply at once without washing out the cavity:

℞ Camphoræ gr.60
Acidi tannici gr.30
Alcoholis . . . . . ℥j. M.

For Inflammation Attending Eruption of Third Molar.

℞ Thymoli . . . . . gr.ij
Acidi benzoici . . . gr.xlv
Tinct. eucalypti . . ℥ijss
Aquæ . . . . . Oij. M.

SIGNA.—Used on borated cotton.

Glyco-Thymoline—KRESS—contains Thymoline, Sodium, Boracic acid, Benzoin, Salicylic acid, Eucalyptol, Betula Senta, Menthol Pini Pumillionis. It is alkaline, antiseptic deodorizing.

Thymacetin bears the same relation to thymol as phenacetine to phenol. It is a white, crystalline powder, slightly soluble in water. Excessive doses cause symptoms of intoxication. Jolly asserts that in certain forms of headache it proves equal to phenacetine. It induces sleep in cases of insomnia. The average dose is gr. viiss.

TRICHLORACETIC ACID—ACIDUM TRICHLORACETICUM.

Formula.—$C_2HCl_3O_2$.

Derivation.—Trichloracetic acid is prepared by the oxidation of hydrate of chloral by means of nitric acid. It consists of colorless, rhombic deliquescent crystals. It belongs to a group of three acids, the other two being the monochloracetic and the dichloracetic acids, and the difference in their composition is due to the proportions of chlorine they contain. They have similar properties.

Medical Properties and Action.—Trichloracetic acid in its full strength is a very powerful escharotic and styptic. It is readily soluble in water and alcohol, with an agreeable odor. It coagulates albumen, and its concentrated solutions are powerfully caustic. Diluted solutions cause an increased secretion of saliva, and destroy its power to convert starch into sugar; it also arrests the digestive action of pepsin. As an antiseptic it has been employed in putrid and indolent wounds, in the form of weak solutions, which are unirritating, and promotes healthy granulations and cicatrization; it has also been employed externally in erysipelas and venereal sores. Internally, it has been recommended by Dr. Filippowitch as a preventive of cholera, in doses of gr. ij to iij, three or four times daily. Externally, it is employed in one or two per cent. solutions. The common dose is gr. ij to v, in very dilute solutions, three times a day.

Therapeutic Uses.—Trichloracetic acid is stimulant, refrigerant, antiseptic, escharotic, caustic and styptic, and a solvent of calculi, in crystal or strong solution. It is also a powerful caustic and escharotic; diluted with water to a strength of three per cent. it is an efficient astringent and stimulant, and diluted to a strength of one per cent. it is useful as a refrigerant mouth-wash. It coagulates albumen, and its concentrated solutions are caustic. Diluted solutions cause an increased secretion of saliva, and destroy its power to convert starch into sugar; it also arrests the digestive action of pepsin. It is employed as an antiseptic in the treatment of putrid and indolent wounds, in the form of weak, unirritating solutions, and promotes healthy granulations and cicatrization; it has also been employed exter-

nally in erysipelas and on venereal sores, the removal of hypertrophied gum tissue, warts, etc., etc. Externally, it is generally employed in one or two per cent. solutions. It destroys all forms of organic life in such a percentage; and in five per cent. solution it arrests the growth of bacteria and other forms of micro-organisms. Internally, it has been administered in cholera, gastric catarrh, etc., in doses of grains ij to iij: for summer complaint of children, the dose is 1/2 to 1 grain, 3 times daily.

Dental Uses.—Trichloracetic acid is employed in dental practice as an escharotic in the treatment of pyorrhœa alveolaris, on account of its destructive effect on pus-secreting surfaces of the alveoli of teeth, for which purpose a ten per cent. solution is applied. It is also employed for the removal of vascular tumors of the pulp, and hypertrophy of the margins of the gums, and epulis. It destroys hypertrophied gum tissue, and when such tissue has grown into and filled up carious cavities in teeth, and been cut away, and the profuse hemorrhage interferes with the filling, an application of trichloracetic acid will not only remove such tissue, but arrests the hemorrhage in a few minutes.

Dr. Kirk speaks of using this acid in the strong solution of about ninety per cent. for the removal of such growths. Trichloracetic acid has also a solvent effect on calculi upon the roots of teeth and on necrosed bone, a ten per cent. solution in water being recommended, and has also been employed on the overhanging and resistant gum of third molars. One application to the pus-pockets of alveolar pyorrhœa, will cleanse the surface of the alveolus and the diseased tissue lining the pocket, and remove any calculi present; any subsequent applications should be not stronger than four per cent. solutions. When used in full strength, it should be followed with bicarbonate of soda to counteract the effect. A one per cent. solution has been successfully employed as a mouth-wash, for its astringent and stimulating action in inflammations and ulcerations; a 20 per cent. solution is recommended for chronic forms of stomatitis. It is also used in combination with pyrozone in the treatment of alveolar pyorrhœa, and in such a solution, as well as alone, its effects have been remarkably satisfactory. Trichloracetic acid may be combined with any suitable alkaline solution, such as

soda or magnesia, when it is desirable to limit its action. It has a peculiar power to soften and remove sanguinary deposits, and it acts without injury to the teeth or soft tissues.

Diluted with water to a three per cent. solution it is an excellent local astringent and stimulant. Dr. Harlan recommends it for removing the overlying gum for third molars, as it destroys the tissue without hemorrhage or subsequent soreness. Trichloracetic acid is also employed to gain access to roots of abscessed teeth through a fistulous opening, one crystal followed by more being placed in the fistula; it is also used for removing gum polypi, in necrosis of the bones of the jaws, and for hypertrophied gums.

TROPACOCAINE—BENZOYL-PSEUDO-TROPEIN.

Derivation.—Tropacocaine is an alkaloid obtained from the leaves of a plant of the coca family, indigenous to Java, and has been isolated by Giesel. The hydrochlorate of tropacocaine was prepared by Lieberman as the base of the product he obtained synthetically; hydrochlorate of cocaine is soluble in water. Unlike cocaine solution, which deteriorates in a few days, the solution of the salt tropacocaine can be kept for several months without decomposition; it is less toxic than cocaine and more prompt in its action. Tropacocaine, by its chemical composition, belongs to the atropine group.

Physiological and Therapeutic Action.—Tropacocaine is a local anæsthetic, and as indicated by a series of exper ments made by Chadbourne, is about half as toxic as cocaine, and, it is claimed, possesses the same local anæsthetic properties without the accidents of the latter agent.

No symptoms indicating the physiological action of tropacocaine followed its administration internally in the case of a dose varying from one-third to three-quarters of a grain; and a submucous injection of nearly one-half grain in ten drops of water in many nervous and frightened persons, produced only a slight increase in the number of radial pulsations, without any changes in the arterial pressure. No bad symptoms apparently followed the hypodermic injection of three-quarters to one grain of tropacocaine even in nervous, anæmic and tuberculous patients, ac-

cording to Pinet and Vian, although they observed, contrary to what occurs in cocaine, an increased activity in the peripheral circulation, the face exhibiting a characteristic rosy hue, and the extremities becoming warm. Their conclusion was that tropacocaine hydrochlorate possesses local anæsthetic properties analogous to cocaine. It is also claimed that the more concentrated the solution of this drug, the more rapid is its action. Its effect upon the nervous system, as well as upon the respiration, is directly opposite to what occurs in the intoxication by cocaine, as an equal part of cocaine has produced dangerous symptoms, and, on the contrary, neither respiration nor the nervous system appears to be influenced by doses of three-quarters of a grain of tropacocaine. And although its use may not be without danger, yet it is undoubtedly much less toxic than cocaine. But from the fact that its toxic action on the heart is very rapid when such does occur (although it lasts but ten minutes, while that from cocaine may last for hours), yet the use of tropacocaine requires caution. Prof. H. C. Wood states that this drug appears to have only a comparatively feeble influence upon the circulation, causing, however, when in sufficient amount, a steady fall in the arterial pressure. When applied to the eye, the anæsthesia is more prompt, and disappears more quickly than with cocaine, sensation being suspended in less than half a minute after the application of a three per cent. solution. Dr. Hugenschmidt claims that the advantages of tropacocaine over cocaine are:

1. Used in equal doses sufficient to produce local anæsthesia, the new drug is much less toxic than cocaine, and has a very slight action on the vital functions of the economy.

2. It produces a local anæsthesia more rapid and more pronounced than cocaine, and of at least as great a duration.

3. The solution of the salt being an antiseptic, as was pointed out by Chadbourne, can be kept for several months without deterioration, while, after a few days, a cocaine solution is worthless for injections.

Dental Uses.—Tropacocaine is employed in dental practice as a local anæsthetic for the extraction of teeth, for the perforation of the alveolus, removing sequestrum, sensitive dentine, opening of abscesses, etc. Dr. Hugenschmidt regards two-thirds of one grain in fifteen drops of water as sufficient in ordinary cases.

For difficult extractions, four-fifths of one grain, he asserts, will produce complete anæsthesia. The injections are made as with cocaine, but not suddenly, as at least one minute should be employed in injecting the dose, which, according to Dr. Hugenschmidt, is ten drops of the following solution: Tropacocaine hydrochlorate, 2 grains; distilled water, 50 drops. M. S.—Gtt. x for one local anæsthesia. The tooth or root to be extracted, or region to be operated on, is surrounded by a series of injections of one or two drops of the above solution until ten drops have been injected. The dose of tropacocaine is gr. 1/3 to 2/3. Before injection the mouth should be made aseptic by washing it repeatedly with 3 per cent. solution of pyrozone, 10 per cent. solution of electrozone, or 3 per cent. solution of formaldehyde. The syringe should also be rendered aseptic by a 25 per cent. solution of phenol sodique, which will not injure the metallic parts. Care should be taken to confine the injections to the gum tissue, as serious emphysema may result from injections into the submucous tissue beneath the junction of the cheek and gum.

Holocaine Hydrochlorate, a non-official preparation; it is antiseptic and therefore its solutions are less liable to decomposition. It is claimed the holocaine is more powerful in its action than cocaine, and, on this account, requires a weaker solution to cause analgesic effects, one per cent. solution being used. It is less soluble than cocaine, but more so than eucaine. It is not, however, without its dangers as a death during its administration is reported. It does not whiten the tissues, nor contract the arterioles.

VASELIN—VASELINE.

PETROLEUM OINTMENT—PETROLATUM, COSMOLINE.

Derivation.—Vaseline is obtained from crude petroleum, in the form of a petroleum jelly. In the distillation of crude petroleum there remains in the apparatus, after the separation of the light oils, a semi-liquid tar, which constitutes crude vaseline, which in such a state, has a disagreeable odor like petroleum, of a strong taste and black color. This compound is heated in the open air, and decolorized by animal charcoal, the product being

the petroleum jelly known as vaseline, which is a mixture of several hydrocarbons. Although used as a basis for ointments, vaselin is not a fat.

When pure, vaseline is white, inodorous and insipid, and of the consistence of jelly or very unctuous fat. It melts at 35° C., boils at 150° C., and distills at 200° C., and burns without residue. Exposed for a considerable time to light, it acquires a slight odor of petroleum. It is insoluble in water, sparingly soluble in alcohol, and very soluble in warm ether, chloroform, fats, volatile oils, and sulphide of carbon. It sensibly dissolves iodine, bromine, sulphur, phosphorus, carbolic acid, benzoic acid, atropine and strychnine.

Medical Properties and Action.—By its composition, vaseline is not capable of becoming rancid, nor of being saponified; hence it is a very useful agent or excipient for caustic alkalies, oxides, metallic salts, and even acids in the cold without action by them, and without modifying their therapeutic properties. Incorporated in ointments, a certain quantity of vaseline will preserve them and obviate rancidity, being preferable to lard, butter, glycerine and glyceroles. The addition of paraffin will give it any consistency desired.

Therapeutic Uses.—Vaseline is used externally as a dressing for wounds, cuts, bruises, sprains, piles, rheumatism, skin diseases, eczema, inflamed surfaces, diseases of the eye, etc., etc. Combined with carbolic acid, it forms a very useful ointment for affections of the skin, putrescent pulps of teeth, etc., etc., under the name of *carbolized cosmoline.*

Dental Uses.—Vaseline is an efficacious application to inflamed and excoriated surfaces of the gums and mucous membrane of the mouth; also as a dressing introduced into the canals of teeth affected with periodontitis, and as an emollient application after the devitalization and removal of dental pulps. Carbolated cosmoline on cotton has been employed for filling root-canals, but the results have not in all cases been satisfactory.

In the form of *Vaseline Camphor Ice,* it is a pleasant and efficacious application to chapped lips and hands, being bland and non-irritating in its action.

An ointment made by dissolving and incorporating thoroughly by the aid of heat, equal parts of vaseline and lead plaster to

which a little bergamot may be added for perfume, is very serviceable for the treatment of excoriated surfaces, and dry desquamating surfaces of certain skin diseases, and especially the form of skin affection which may result from the constant use of scented soaps on the hands.

DENTAL FORMULA.

Local Anæsthetic.

DR. POINSOT.

℞ Oleo-naphthine (liquid vaseline),
Arachis oil . . . . . āā 50 centigrammes.
Pure cocaine. . . . . 5 centigrammes.
M.—Dissolve the cocaine in a hot water bath and wash gum where the injection is to be made with absolute alcohol. S.—Make a number of injections around tooth slowly, and wait 8 minutes.

Vaselone.—Vaselone is a substitute for vaseline and consists of a solution of stearone and margarone in neutral mineral oil. Stearone is prepared by distilling stearine with lime. Margarone is prepared in a similar way, from beef suet. Vaselone consists of 15 parts of margarone and 5 of stearone, in 100 of thoroughly purified and odorless mineral oil. The fatty product obtained, after cooling, resembles vaseline, but is not as transparent. It is white, odorless, neutral, and not affected by acids and chemical reagents.

VERATRINA—VERATRINE.

Source.—Veratrine is an alkaloid, or a mixture of alkaloids, obtained from the seeds of *Asagræa officinalis*, of the natural order *Melanthaceæ*. It is n the form of a white, or grayish-white amorphous powder, of an acrid taste, imparting a sensation of tingling and numbness to the tongue, and causing constriction of the fauces and violent sneezing. It is but slightly soluble in cold or hot water, to which it imparts an acrid taste and a somewhat alkaline reaction.

It is soluble in three parts of alcohol at 59° F., and very soluble in boiling alcohol; also soluble in 6 parts of ether, in 2 parts of choloroform, and in 96 parts of glycerine; it melts when heated.

VERATRINE OINTMENT—*Unguentum Veratrinæ*—is composed of veratrine, 4 parts; alcohol, 6 parts; benzoinated lard, 96 parts. The veratrine is rubbed with the alcohol in a warm mortar until dissolved, and the benzoinated lard gradually added and thoroughly mixed.

Therapeutic Uses.—Veratrine is only used externally in neuralgia, myalgia, headache, rheumatism, paralysis, etc., in the form of the ointment, or dissolved in alcohol.

Dental Uses.—Veratrine, in the form of the ointment, is used for facial and other forms of neuralgia, a small quantity being rubbed over the seat of pain. It is also used as an obtundent of sensitive dentine.

DENTAL FORMULÆ.

For Sensitive Dentine.

DR. BOGUE.

℞ Veratrinæ . . . . . gr.iv
Acidum tannicum . gr.j
Alcoholis . . . . . gtt.xx
Glycerini . . . . . f℥j
Acidi carbolici . . . ℥ij. M.
SIGNA.—Dry the tooth thoroughly and apply to sensitive surface.

For Facial Neuralgia.

DR. GARRETSON.

℞ Veratrinæ . . . . . gr.iv
Aconitiæ . . . . . gr.ij
Olei tiglii . . . . . gtt.ij
Olei olivæ . . . . . ℥ij. M.
SIGNA.—Rub over affected part thrice daily.

VERATRUM VIRIDE—AMERICAN HELLEBORE.

POKE ROOT.

Source.—Veratrum Viiide, of the natural order *Melanthaceæ*, the officinal portion of which is the root, is indigenous to the swampy portions of the United States, and is prepared in the form of slices or fragments, of a dark or blackish-gray color externally, and of a grayish-white color internally. Its odor is peculiar, especially when it is moistened, and its taste is bitter and acrid. It is inodorous, but in the form of powder is sternutatory. It is similar in chemical composition to veratrum album—white hellebore and veratrum sabadillæ. Like veratrum album, it contains a quantity of soft resin, and two alkaloids—*jervia and veratroidia.*

Medical Properties and Action.—Veratrum viride is acrid and sedative, causing redness and heat when applied to the skin, and has a violent sternutatory effect on the Schneiderian membrane.

Small doses stimulate the secretions and depress the pulse. Although a prompt emetic, its operation is attended with intense nausea and depression and violent, persistent vomiting. Large doses occasion great depression, with a weak action of the heart and pulse, vomiting, retching, cold surface of body, a cold perspiration, faintness, dimness of sight, dilatation of the pupils, great muscular weakness, slow respiration, and sometimes coma, insensibility and stertorous breathing, but notwithstanding such symptoms, fatal results are rare. The antidotes are free stimulants. The tincture—*Tinctura Veratri Viridis*—is the best preparation for internal administration.

Therapeutic Uses.—Veratrum viride is not employed for its emetic effect on account of its violent action. Internally it is administered in diseases of the heart, active hemorrhage in the plethoric, to reduce the temperature and pulse in typhoid and other fevers, in acute mania and delirium, in puerperal convulsions, neuralgia, neuralgic headache, etc. Externally it is employed for neuralgia, myalgia, headache, rheumatism, paralysis, etc.

Dose.—Of the tincture of veratrum viride, ♏i to ♏v; of the fluid extract of veratrum viride—*Extractum Veratri Viridis Fluidum*, ♏ij to ♏v; veratrina, gr. 1/50 to 1/10.

Dental Uses.—In dental practice, the tincture of veratrum viride has been employed internally for neuralgia of the fifth nerve; also in periodontitis, as a sedative, also in severe hemorrhage from the extraction of teeth, to depress the heart's action.

DENTAL FORMULA.

For Facial Neuralgia.

DA COSTA.

℞ Veratriæ . . . . . gr. xv
Aconitæ . . . . . gr. ij
Glycerinæ . . . . . f℥ij
Cerati adipis . . . . . f℥vj, M.

SIGNA.—To be rubbed over painful part, care being taken to see that there is no abrasion of the skin.

XANTHOXYLUM—PRICKLY ASH.

Source.—Xanthoxylum is a shrub growing in the northern Middle and Western States of North America. The bark is the

officinal portion, and is obtained in the form of pieces, more or less quilled, of one or two lines in thickness and of a whitish color, with an ash-colored epidermis. It is quite inodorous and has a taste at first sweetish and slightly aromatic and afterwards bitter and acrid.

Medical Properties and Action.—Xanthoxylum is aromatic, stimulant and sialogogue, and when swallowed occasions a sense of heat in the stomach, more or less general arterial excitement, and a tendency to diaphoresis.

Therapeutic Uses.—Xanthoxylum has been administered with considerable benefit in the chronic form of rheumatism.

Dose.—Of powdered xanthoxylum, gr. x to ℥ss, three or four times a day.

Dental Uses.—Xanthoxylum, in the form of the powder, has been applied with success to an aching pulp for the relief of odontalgia, and a decoction of the bark is employed as a wash for foul ulcers; in the form of a tincture it is efficacious in relieving the soreness which remains after the extirpation of the dental pulp; it is applied on floss silk or cotton. In the Southern States the Angelica Tree—*Aralia Spinosa*—sometimes called "Toothache Tree," is often called prickly-ash, but it differs from xanthoxylum, although its tincture answers for the relief of odontalgia.

CHLORIDE OF ZINC—ZINCI CHLORIDUM.

Formula.—$ZnCl_2$.

Derivation.—Chloride of Zinc is obtained by the action of hydrochloric acid on granulated zinc, the solution thus made being purified by a solution of chlorine and carbonate of zinc, when it is evaporated till it assumes a solid form. It is in the form of a white deliquescent salt, freely soluble in water, alcohol and ether, as soft as wax and capable of being melted and sublimed by heat. As it rapidly deliquesces when exposed to the air, it should be kept in glass-stoppered bottles. It has a styptic, metallic taste, which is very disagreeable.

Medical Properties and Action.—Chloride of zinc is the most active of the zinc preparations, being a powerful and penetrating escharotic; it causes a white eschar. Its local action as a caus-

tic depends upon its affinity for albumen and gelatin, and when in contact with living parts it destroys their vitality, and uniting with the albuminous and gelatinous matters present, forms an eschar. It is also a useful antiseptic, deodorizer and disinfectant, and largely diluted has been employed as a nervine tonic; but as the milder preparations of zinc answer the same purpose, it is rarely employed internally. On account of the great affinity for water and its power of combination with albumen, chloride of zinc penetrates and spreads deeply, and produces an eschar which is white, thick and hard. When applied to malignant and indolent ulcers, it promotes healthy granulations, and also when topically applied it not only destroys the diseased structure, but excites a new and healthy action in the surrounding parts. When employed as a caustic, it does not give rise to constitutional disorder from absorption, an effect which is sometimes caused by arsenical preparations. In over-doses it causes a burning pain in the throat and stomach, nausea, vomiting, cold sweats, decrease of pulse, cramps of the limbs, etc., being a powerful irritant poison. The antidotes in poisoning by zinc salts are albumen, carbonate of soda, magnesia and soap.

Therapeutic Uses.—Chloride of zinc has been employed internally in chorea, epilepsy, neuralgia, scrofula, and combined with hydrocyanic acid, in facial neuralgia. Externally it is applied to malignant growths, gonorrhœa, indolent ulcers, etc. A solution of the chloride of zinc is used as an antiseptic and disinfectant.

Liquor Zinci Chloridi—*Solution of Chloride of Zinc*—known as "Burnett's Disinfecting Fluid," is composed of chloride of zinc, gr. cc, water, ℥j.

Dose.—Of chloride of zinc, gr. ss or gr. j, or gr. ij, largely diluted.

Dental Uses.—Chloride of zinc is a valuable agent in dental practice, being employed as an external application to sensitive dentine. As an obtunding agent, a drop of the deliquescent chloride is placed in contact with the sensitive dentinal surface (which has previously been dried and is protected from all moisture), and allowed to remain from two to four minutes. Considerable pain follows the application of the chloride, which is of a steady continuous character, without the throbbing nature

which characterizes the pain of an irritated dental pulp. Its painful action may be modified by bathing the sensitive surface, prior to the application of the chloride, with chloroform, tincture of aconite or atropine solution, or a combination made. When the pain has subsided, the excavation of the cavity can be proceeded with until the layer of dentine affected by the chloride has been removed, when another application may be necessary. As it is not absorbed by the dentine to any great degree, its action being superficial, it is not so dangerous an agent as is arsenious acid when employed for the same purpose.

In no case should the chloride of zinc be used as an obtunding agent, when there is danger of irritating the pulp of the tooth.

Chloride of zinc is also employed to arrest superficial hemorrhage from a wound of the gum during the filling of teeth; it will also temporarily arrest the secretion of mucus from the surface of the mucous membrane of the mouth. When applied to a cut surface, diluted, it induces union by first intention, by its effect upon the glutinous matter. For astringent and antiseptic solutions, the strength is from 1 to 20 per cent; for disinfecting the mouth 1 to 5 per cent. solutions are employed.

It has also been successfully employed as an injection for chronic alveolar abscesses, and in the treatment of ulceration of the gums attended with recession of gum and absorption of process from the necks of teeth, also as an injection in disease of the antrum. It has been claimed that its application in a diluted form will promote the formation of secondary dentine over a nearly exposed pulp, but its escharotic action must be considered in using the agent for such a purpose. When applied to the sulcus which often forms during ulceration and recession of the gum from the neck of a tooth, the application can be safely and conveniently made by means of a camel's-hair brush, or by a piece of orange wood so shaped as to permit of its being introduced to the bottom of such a sulcus.

Chloride of zinc is also employed as a stimulating astringent in alveolar pyorrhœa in the form of a solution of five to ten grains to the ounce of water. Chloride of zinc in a properly diluted form is an efficient disinfectant, and has been employed for such a purpose in gangrenous conditions of the mouth.

Chloride of zinc is one of the ingredients of the temporary

filling material composed of the chloride of zinc in solution and the oxide of zinc, which has been employed to cap the exposed pulps of teeth. But owing to the escharotic action of the chloride this method has not been uniformly successful. The zinc preparations, however, answer good purposes as temporary filling materials, especially in sensitive cavities where the presence of metallic fillings would not be tolerated. Burnett's disinfecting fluid contains 200 grains to the fluid ounce. The antidotes to zinc poisoning are albumen and a dilute solution of either sodium or carbonate of potassium. (See Oxide of Zinc.)

DENTAL FORMULA.

For Inflamed Gums and Mucous Membrane.

DR. W. S. ELLIOTT.

℞ Zinci chloridum . . . . . grs.x
Acidi carbolici . . . . . gtts.xx
Glycerini . . . . . .
Aquæ . . . . . āā ℥ss. M.

Sulpho-carbolate of zinc has to a great extent replaced the chloride of zinc as an antiseptic, as it is less toxic and irritating and much more potent.

ZINCI IODIDUM—IODIDE OF ZINC.

Formula.—ZnI_2.

Derivation.—Iodide of zinc is obtained by digesting an excess of zinc with iodine diffused in water. It is in the form of fine, white, deliquescent needles, very soluble in water, and of a metallic, styptic taste, resembling that of sulphate of zinc, and is very liable to spontaneous combustion.

Medical Properties and Action.—Iodide of zinc is tonic, astringent and antispasmodic.

Therapeutic Uses.—Iodide of zinc has been favorably employed in chorea, cachexia, scrofula and hysteria. It has been used for strumous inflammations and enlargements, both externally and internally. Externally it is an efficient local stimulant and escharotic, and is considered to be equal, if not superior to chloride of zinc. In enlarged tonsils it has been advantageously employed in a solution of 10 to 30 grains to the ounce of water.

In the form of an ointment composed of a drachm of the iodide to the ounce of lard, it has been used in the treatment of tumors.

Dose.—Of iodide of zinc, gr. j, gradually increased to gr. vj, given in the form of syrup.

Dental Uses.—Iodide of zinc is a valuable local application in alveolar pyorrhœa, tumors of the mouth, enlargement of the tonsils, etc. In alveolar pyorrhœa it is used in connection with peroxide of hydrogen, which see.

DENTAL FORMULÆ.

For Alveolar Pyorrhœa.

DR. A. W. HARLAN.

℞ Zinci iodi . . . gr.xij to xxiv
Aquæ . . . . . f℥j. M.

SIGNA.—After drying the gums, inject each pus-pocket with one, two or three drops of this solution.

For Alveolar Pyorrhœa.

DR. A. W. HARLAN.

℞ Zinci iodi . . . . . gr.x
Aquæ . . . . . ♏xc. M.

SIGNA.—Inject with a syringe if the pockets are shallow without much carious process.

ZINCI OXIDUM—OXIDE OF ZINC.

Formula.—ZnO.

Derivation.—Oxide of zinc is obtained by subjecting precipitated carbonate of zinc to a red heat, till the whole of the carbonic acid and water are expelled.

It is in the form of yellowish-white powder, insoluble in water, but soluble in dilute sulphuric and hydrochloric acids, without effervescence. It is inodorous and tasteless.

Medical Properties and Action.—Oxide of zinc is tonic and antispasmodic, but in large doses causes vomiting and purging; by gradually increasing the dose, large quanties can be taken without injurious effects. It should never be given on an empty stomach, as it may cause nausea.

Therapeutic Uses.—It is employed in spasmodic asthma, convulsions of children, epilepsy, chorea, whooping-cough, hysteria, and is an excellent remedy for gastralgia; also in chronic diarrhœa and chronic dysentery.

Dose.—Of oxide of zinc, gr. ss to gr. x.

Dental Uses.—Oxide of zinc may be employed in the treatment of convulsions of children during dentition, given in doses of

gr. ss to gr. v, gradually increased to gr. viij, in powder, with a little sugar. It is also combined with carbolic acid, in a fluid form, for capping exposed pulps, being applied in the form of a paste to the exposed surface of the dental pulp. It also forms an ingredient of the zinc-filling materials, and of the celluloid base for artificial teeth. Dr. Edw. Eggleston recommends a combination of oxyphosphate and gutta percha as a filling material for large cavities in proximal surfaces of posterior teeth, extending below gum margin. The cavity is first filled one-third full of gutta percha and completed with the oxyphosphate. It is generally supposed that alkalies, especially ammonia, have more effect in disintegrating oxyphosphate fillings in the mouth than have acids.

DENTAL FORMULÆ.

Oxyphosphate of Zinc Preparation for Filling Teeth.

POWDER.

℞ Zinci oxidi . . . . partes 200
Silicii (fine powd.) . partes viij
Sodii boratis . . . partes iv
Pulv. glass . . . partes v

Levigate under water to ensure complete admixture, and dry by evaporation; then calcine at white heat; then reduce to powder.

LIQUID.

℞ Acidi phosphorici,
Aquæ . . . . . q.s. to

dissolve and evaporate the solution by aid of heat, until it is of the consistence of glycerine.

Another Formula for the Oxyphosphate Preparation in which simply the calcined oxide of zinc and glacial phosphoric acid are employed, is prepared as follows:

Calcine the oxide of zinc for two hours at a white heat, or until it becomes a hard, yellowish mass; then pulverize in a mortar, and sieve through fine bolting cloth. For the liquid take ℥j of glacial phosphoric acid (German), in crystals, and dissolve in f℥j of water, and then evaporate to one-third, on a sand bath.

Oxychloride of Zinc Preparation for Filling Teeth.

POWDER.

℞ Zinci oxidi . . . . gr. xxx
Sodii boracis . . . . gr. ij
Silici (fine powd.) . . gr. j.

Mix thoroughly and subject to a bright-red heat in a crucible. Then grind this frit to a powder, and mix it with three times its weight of calcined oxide of zinc.

LIQUID.

℞ Zinci chloridi (deliq.) . f℥j
Aquæ . . . . . f℥v to vj.

For Neuralgia of the Head.

VON NIEMEYER.

℞ Ext. hyoscyami,
Zinci oxidi . . . āā ℈ij. M.

SIGNA.—Fiat pill, xj.

Begin with one pill morning and evening, and increase to xx or xxx daily.

For Pulp Devitalization.

DR. CRISSMAN.

℞ White oxide of zinc 7/8
Hydrochlorate of cocaine, crystals of . . 1/8
Creasote q. s. to make a paste.
After removal, apply tannin dissolved in glycerine or alcohol.

ZINCI SULPHAS—SULPHATE OF ZINC.

Formula.—$ZnSO_4 + 7H_2O$.

Derivation.—Sulphate of zinc is obtained by the action of sulphuric acid on granulated zinc, the solution being purified by means of chlorine and carbonate of zinc, and afterward evaporated, the product being crystals of sulphate of zinc. It is in the form of colorless crystals, which effloresce on exposure to air, and are soluble in 0.6 part of water, .3 parts of glycerine, and insoluble in alcohol, resembling in appearance Epsom salts. It has a disagreeable, metallic, styptic taste; acid in reaction, and coagulates albumen.

Medical Properties and Action.—Sulphate of zinc is tonic, astringent, antispasmodic, and, in large doses, emetic. Externally, it is stimulant and astringent. When its use is long continued, it produces symptoms like those of lead. When administered in proper doses, it exerts an antispasmodic influence on the nervous system, and where there is spasm and convulsion, it is very serviceable.

Therapeutic Uses.—It is internally administered in epilepsy, chorea, hysteria, angina pectoris, chronic dysentery, flatulence, night sweats of phthisis, etc., and is a prompt emetic in cases of narcotic poisoning. Externally, it is employed in the treatment of gonorrhœa of the eye, chronic skin diseases, epithelioma, ulcers, gangrene, conjunctivitis, disease of antrum, etc.

Dose.—Of sulphate of zinc, gr. 1/4 to gr. vi. For an emetic in cases of poisoning 10 to 30 grains will prove sufficient, well diluted with water, and repeated every fifteen minutes until emesis occurs.

Dental Uses.—Sulphate of zinc is employed externally in dental practice, in gangrene of the mouth, disease of antrum, ulcerations of mucous membrane, and indolent ulcers, acting as a stimulant and astringent.

Dr. Northrop recommends for alveolar pyorrhœa a saturated solution of sulphate of zinc, and a saturated solution of iodide of potassium, equal parts, which combination in turn is saturated with the crystals of iodine.

DENTAL FORMULÆ.

For Gangrene of the Mouth (Cracrum Oris).

℞ Zinci sulphas . . . . gr.xx
Mellis . . . . . ℥j. M.
SIGNA.—To be applied with a camel's-hair brush.

For Ulceration of Mucous Membrane of the Mouth.

℞ Zinci sulphas . . . gr.j to v
Aquæ destillatæ . . . ℥j. M.
SIGNA.—To be used as a gargle or lotion.

For Chronic Alveolar Abscesses, Abscess of Antrum, etc.

DR. G. L. PARMELE.

℞ Zinci sulphas . . . . . gr. iij
Plumbi acetas . . . . . gr. v
Tinc. catechu . . . . . gtt.x
Aquæ . . . . . f℥j. M.
SIGNA.—Use as a stimulating injection.

ANTISEPTICS IN DENTAL PRACTICE.

The term *antiseptic* implies the prevention of septic influence or putrefaction in wounds, and the healing of wounds by first intention or without suppuration. *Asepsis* is a condition that implies the absence of disease germs.

Antiseptics are medicinal substances which possess the power of arresting the process of putrefaction, and they embrace such drugs as organic (vegetable) acids, inorganic (mineral) acids, the former, such as carbolic, salicylic and benzoic acids being applicable to tooth structures, and tooth tissues; while the latter, such as nitric, sulphuric, hydrochloric, boracic and chromic acids, are restricted to the treatment of tooth-tissues; also, the iodides, which include the tincture of iodine, iodoform, iodol, potassium iodide, aseptol, aristol; also the mercurials, such as the bichloride and biniodide of mercury; also such oxidizing agents as peroxide of hydrogen and permanganate of potash; also the essential oils, such as cajuput, cassia, peppermint, cloves, thyme, turpentine, caraway, mustard, eucalyptus, juniper, gaultheria, cinnamon, eugenol, sassafras, pennyroyal, valerian, etc.; also the wood and coal-tar derivatives, such as creasote, hydronaphthol,

resorcin, lysol, etc.; also heat. The methods of using antiseptics in dental practice are by irrigation, disinfection, and as antiseptic dressings. Irrigation consists in washing out cavities in teeth, applications to inflamed and infected surfaces, syringing abscesses and the use of mouth-washes or lotions, diluted aqueous solutions or antiseptic agents being considered preferable to concentrated solutions for such purposes. Deodorants are agents that remove or correct offensive or fetid odors.

Disinfection consists in the destruction of micro-organisms and the products of fermentation and putrefaction in carious cavities, pulp-canals, gangrenous pulps, etc.

Antiseptic dressings or applications are in the form of powders, solutions and pastes, or mixed with filling materials, such as the preparations of zinc. When acids are used as antiseptics, they must be so diluted as to deprive them of their caustic properties or action, and the mercurials, such as the bichloride, must be in such weak solutions as will prevent toxic effects on the system. Different antiseptics are required according to the anatomical structure of the part on which they are to act, and also its physical condition, as the inflammation present may be either acute, or chronic, or the tissue be in a septic or putrescent state; hence, each condition demands a particular class of antiseptics. The strength of the antiseptic employed will also depend upon the condition of the tissue or structure at the time of application. Dr. W. D. Miller established the relationship of micro-organisms to the etiology of dental caries, and also showed that all fermentative and putrefactive processes of the dental pulp and oral mucous membrane are conditioned by the presence of living bacteria. From experiments made by Dr. Miller on the comparative value of antiseptics for sterilizing cavities, etc., he concludes that bichloride of mercury, "which usually ranks as the king among antiseptics," and gave uniformly good results in one method he employed, fell considerably short of the striking action shown by the trichloride of iodine, and he further remarks that "we have consequently reasons to hope that the trichloride of iodine may prove a valuable remedy in the treatment of diseased conditions of the teeth and mouth, and that the five per cent. solution is one of the most active agents at our command for disinfecting carious dentine. Of carbolic acid

he says, while it is a very active antiseptic agent, it falls considerably behind the bichloride of mercury and trichloride of iodine in its penetrating power. Of lysol and trichlorphenol, he says that the results were very similar to those obtained by carbolic bcid. Of peroxide of hydrogen, he says, that although it is is an excellent sterilizer for thin layers of carious dentine, it fails when applied to thicker ones, as antiseptics applied to cavities of decay on cotton naturally retain their power but a few hours; pledgets of cotton saturated with carbolic acid and placed in large cavities near the gums lose their antiseptic action in twenty-four hours. Of chloride of zinc, he thinks that although it penetrates the tissue quite rapidly, yet its antiseptic power is inferior to that of many other available antiseptics, and that the pain attending its application to the nearly exposed pulp, more than counterbalances any slight advantage it might otherwise have over carbolic acid.

Hydronaphthol showed considerable penetrating, antiseptic and consequently preservative action. Iodoform he considers to be one of the most worthless antiseptics, and that this fact has not been revealed long ago is in part due to the circumstance that it is nearly always employed in conjunction with some other material, such as carbolic acid, oil of cloves, etc.

The essential oils, pyoktanin, benzoic acid, alcohol, thymol and resorcin, all fell far short of the standard of efficiency maintained by other antiseptics for sterilizing carious cavities. He found that thymol and salicylic acid manifested an evident preservative action upon the dental pulp, but the effects were confined to a small portion of the pulp. Of the two, thymol gave the better results. Of the aniline colors, methyl violet and methylene blue, neither, he says, has the slightest preservative action, nor did they penetrate the pulps to a depth of more than a quarter of an inch. Campho-phenique, he says, appeared to penetrate the pulp-tissue about as rapidly as carbolic acid, and moderately hardened the tissue, giving to it antiseptic properties by the absorption of the solution, but not equal to that imparted by carbolic acid alone.

The antiseptics Dr. Miller found to be preeminently active in preventing decomposition of pulp-tissue, were: bichloride of mercury, cyanide of mercury (?), trichlorphenol, sulphate of

copper, carbolic acid, oil of cloves, chloride of zinc, campho-phenique (?), hydronaphthol (?).

Those of less value: thymol, salicylic acid, eugenol, *a* and *b* naphthol, acetico-tartrate of aluminum, five per cent. solution of bichloride of mercury, and possibly some essential oils.

According to Dr. Black, "infectious matter contains living particles that will grow and reproduce themselves. Septic matter may be in solution; it is poisonous. It is the product of the growth of micro-organisms, and it is this product of the dentine that is dangerous in many cases, to the exclusion of infectious matter; for while infectious matter may be in the dentine, may live there for a time, it certainly will not live there very long if communication by which it receives food is cut off. It must receive food in any case, and must get clear of its waste products or it will soon be choked. Though microbes may not be present in the dentine, there is danger of poisoning from the septic matter that is absorbed, filling the dentinal tubules. We have a different set of conditions when we leave a little bit of softened dentine over a pulp nearly exposed. We may cover in the anaerobic microbes. In a short time they produce products that will destroy the pulp, or they may pass through and penetrate into the pulp, and we may have an infected pulp presently from the microbes we have covered in. This action is brought about rapidly, and the poisonous matter escapes toward the pulp. If we have covered them in with the filling we have sealed up the elements for destroying that pulp. It is not necessary that the dentine be softened more; it may not be a class of microbes that soften dentine. It is a microbe that attacks the sarcous elements of the body; the contents of the dentinal tubes are attacked just as well. So here we need a disinfectant. What shall we use? Certainly not one of the coagulants (such as carbolic acid, creasote and chloride of zinc—agents which seal the septic matters within the teeth); certainly not one that places a barrier to its own penetration by coagulating the albumen. These are not the antiseptics you should use in this place, but something we can depend upon to penetrate in the presence of albumen, and we find that to-day in the use of the essential oils, and among them the oil of cassia is the most potent. There are many of the essential oils that when used in substance will

destroy microbes just as quickly as the oil of cassia, and among them may be mentioned the oil of turpentine, but there is none of them that will destroy microbes so rapidly and so certainly with that proportion of the oil that will dissolve in water, or the fluid with which they come in contact in their application in practice as the oil of cassia. In bacteriology, the terms *germ*, *bacteria*, *microbe*, *schizomycetes*, are used almost as synonymous names, but microbe seems preferable to germ or bacteria, and schizomycetes is considered to be a better scientific term than either. It is also conceded that these are unicellular and assimilate nourishment apparently by absorption in the media in which they live, but they must alter their foods found proper, and yet unfit in nature for their use and appropriation. Bacteria, living or dead matter encounter no living resistance, while those feeding on living tissues, or fluids in living tissues, meet the living cells of the body and have to combat them. The diastases secreted by the various beings, whether highly organized, or unicellular and microscopic, have something in common as to their respective objects and their properties of transforming matter. The roll of microbes in existence is complex and necessary, though some are injurious. They act as scavengers, return to the air and water the organizable elements abstracted daily by the vegetables and indirectly by animals, and are indispensable to life. The bacteria that invade living organisms which happen to be fit for their nourishment and growth are considered to be parasites. The spontaneous generation of living organisms, no matter how little, is now regarded as a fallacy.

Formerly, when the root-canal of a tooth was opened and found to be empty and dry, peridental trouble resulted. But the treatment of such cases, as now pursued, consists in excluding the saliva and atmospheric microbes, with antiseptic precautions, the removal of every particle of débris, and the application of antiseptics and disinfectants. To render a pulp-canal permanently aseptic, it should be thoroughly cleansed with either alcohol, peroxide of hydrogen or ammonia, using a syringe to prevent septic matter being forced through the foramen. After the alcohol has evaporated, or the canal thoroughly dried of the peroxide of hydrogen or ammonia, by means of a hot-air syringe, an application of the bichloride of mercury or other antiseptic and germi-

cide is then made, and the canal rendered permanently aseptic. In an open pulp-canal containing partly devitalized pulp tissue, the same care must be exercised to cleanse, disinfect and render aseptic. When alveolar abscess exists as the result of a devitalized pulp, similar treatment is indicated; and in all cases where a pulp has been destroyed by therapeutic remedies or agents, the treatment consists in cleansing, disinfecting and filling the pulp-canals.

Dr. A. W. Harlan remarks: "All cavities in living and pulpless teeth are infected through the agency of pathogenic bacteria or micrococci. (Black, Miles, Underwood and Miller.) These micro-organisms and other septic matters cannot be destroyed in excavating a cavity in a living tooth short of destruction of the pulp by coagulating drugs save in rare instances. Dilute solutions of bichloride of mercury, peroxide of hydrogen and some of the naphthol compounds, belong to this class; coagulators cannot be used in a sufficiently diluted state to accomplish disinfection without injury to the parts to which they are applied. Diffusible drugs will destroy septic materials, including cause of infection, without injury to the living hard or soft tissues. The above will apply as well to infected pulpless teeth, and this is even true with reference to the coagulation of the exposed organic matrix in the interior of a tooth partly softened by caries. Coagulating agents simply coagulate and leave the coagulum to become a source of food supply to the aerobic and anaerobic microbes."

Dr. Harlan recommends the following for softened dentine: Corrosive sublimate, peroxide of hydrogen and tartaric acid combined, applied with wood or platinum points; then dry the cavity and apply myrtol in full strength and dry it again. He also says: If it is deemed a necessity to apply an antiseptic agent to a cavity in a tooth having a living pulp, an oil (one of the essential oils, such as peppermint, camphor, turpentine, thyme, cassia, cinnamon, caraway, eugenol, cajuput, eucalyptol, terpinol, myrtol, sassafras), may be left in contact with the cavity, sealed with gutta percha, or the cavity may be stopped with oxysulphate of zinc for any number of days. The cavity should be well dried before introducing the oil. He also remarks that there is no theoretical objection to the use of carbolic acid in a living tooth,

if it is reapplied from time to time perfectly warmed. It should not be used to protect the pulp from the invasion of micro-organisms or deep-seated cavities, as it will prove inadequate by lack of diffusibility.

"It is a mistaken idea to suppose that an agent like carbolic acid, liquefied or diluted with water, will prove a permanent antiseptic in the presence of moisture, such as is nearly always present in a tooth. It does not possess embalming properties because it is easily absorbed and disappears. It should form no part of root-filling, nor should it be introduced into roots permanently. Copal, Canada balsam, or other agents of this class, may be used on an exposed pulp in its stead, and for injection into abscesses, using the root of the tooth as a channel, potass-permanganate, silico-fluoride of sodium, boro-glycerine, the oil of cloves, cassia, cinnamon, myrtol, and agents of this class, are far more powerful, with better stimulating, antiseptic and disinfectant properties, and they do not possess the coagulating properties of carbolic acid, or its disagreeable odor, and under no circumstances will they clog a delicate canal or destroy the soft tissue to which they are applied. Carbolic acid should take its legitimate place as a spray, a local anæsthetic and component of mouth-washes in dental practice, and as an adjuvant to the oils where local medication around the roots of teeth may be indicated, or for injection into the antrum of Highmore, combined with tannin, glycerine, camphor or potash, or be relegated to the laboratory as a component of sodium phenate, or in other chemical uses." Dr. E. H. Long remarks that asepsis of the mouth is impossible of attainment, but the site of operation may usually be made aseptic after the exclusion of the fluids by a sterile rubber dam and the condition then maintained through the use of sterile instruments by sterile hands; and that the operator should seek to begin his operation with perfect asepsis.

Disinfecting or Sterilizing Instruments, Etc.—Dr. W. D. Miller, in an article on the disinfection of dental and surgical instruments, says: "There is no department of surgery in which the demand for antiseptic procedure is more urgent than in dentistry, for the reason that all of our operations are performed upon septic or infected tissues, and we have no means of rendering the territory to be operated upon aseptic except by the use of an-

tiseptics of the highest character. We cannot extract a tooth, cleanse the canal of a pulpless tooth, excavate a cavity of decay or lance the gums; we cannot even touch any point in the oral cavity without our instruments becoming coated with a layer of infectious material. We are therefore bound to use antiseptics, not only for the purpose of disinfecting the already infected tissues, but for sterilizing our instruments to avoid the transmission of infectious matter from one patient to another." "The necessity for absolute cleanliness on the part of the dentist, of his hands as well as of his instruments, napkins, drinking-glasses, rubber-dam, in short of everything with which he comes in contact with the patient's mouth, is universally recognized; at least there can be no one who has the courage to express a contrary opinion." "We can never know what virus may be clinging to our instruments, nor can we with certainty predict the result of a wound upon the gums, cheeks or lips with an unclean instrument."

From Dr. Miller's experiments we deduct the following: Boiling napkins for 10 or 15 minutes in soap-water completely sterilizes them. Small pieces of rubber-dam can be sterilized as a rule by exposing them for 30 minutes to a five per cent. solution of carbolic acid; small and large pieces of the dam are completely sterilized by subjecting them to boiling water for from six to fifteen minutes, according to size.

Drinking or rinsing glasses can be sterilized by boiling in pure water. Concerning instruments, he says: The ideal antiseptic is a liquid which acts immediately upon bacteria without in any way injuring the instrument. His results were as follows: A five per cent. solution of carbolic acid required one hour to sterilize instruments, and even after such a time the result was not certain; and of twenty-one pieces placed in concentrated carbolic acid for varying periods of time ranging from one to twelve minutes, only two were sterilized.

A five per cent. solution of trichlorphenol required an hour's time to sterilize. Lysol gave results nearly identical with those of trichlorphenol. An action of from fifteen to twenty minutes in a five per cent. aqueous solution of the bichloride of mercury gave the most promising result and can be relied upon to produce thorough sterilization; but he considers the time required to be

so long as to render a five per cent. solution of the bichloride of mercury unsuitable for the purpose; besides the powerful action of this agent upon steel or iron is a serious objection to its use as a sterilizer. A ten per cent. solution of the peroxide of hydrogen came next to carbolic acid, but is considerably inferior to it. The essential oils in emulsion, as well as in pure form utterly failed to sterilize.

He finally concluded that boiling water is far superior to chemical antiseptics, and all other means, for sterilizing dental instruments, and that its easy application and rapid action should recommend it to every practicing dentist and physician. He regards an exposure of three minutes to boiling water sufficient for sterilizing the smaller dental instruments, and five minutes for any other. The addition of soda will prevent the rusting which is liable to occur when the instruments are boiled in water alone; hence a boiling solution of carbonate of sodium appears to be the most promising. Dr. Miller recommending an exposure of three to five minutes to a boiling one or two per cent. solution of soda for sterilizing dental and surgical instruments. The solution must not be simply hot, but boiling, since the motion of the boiling water materially assists in rapidly raising the temperature of the instruments to 100° C., and at the same time loosens up any matter that may be clinging to them. Solutions of such agents as bichloride of mercury, campho-phenique eugenol, oil of cassia, oil of turpentine, terpinol, formaldehyde gas generated by heating over an alcohol lamp a pastil containing 5 grains of paraform, lysol, carbolic acid, aseptol, trichlorphenol, a boiling solution of carbonate of sodium, are employed for disinfecting dental instruments and appliances. Bichloride of mercury, although an effective sterilizer, will injure instruments. Steam is an efficient sterilizer, and a simple method for its use is recommended by Dr. K. C. Gibson; it consists in placing the instruments in a cotton or linen bag tied closely at the top, which is put into the ordinary dental vulcanizer, and subjected to steam pressure, as shown by the thermometer, of 230° F. for ten minutes. A small quantity of bicarbonate of soda placed in the water will prevent the instruments from rusting. (See Formaline for disinfecting instruments, etc., with formaldehyde gas.)

To Render the Hands Aseptic.—Dr. Noble says: Trim the nails

reasonably short, and clear the subungual spaces with the knife blade. Then thoroughly wash the hands and forearms in warm water, a good lather being made with soap, and a stiff brush vigorously applied. Renew the water three times. Next soak the hands in a saturated solution of oxalic acid. According to circumstances the finger tips are then soaked in peroxide of hydrogen. For the final bath, corrosive sublimate solution, 1 to 1000, is employed; allow the hands to remain in this solution three minutes.

TEST-PAPERS FOR DENTISTS.

Very frequently it is important to the dentist to know whether his peroxide of hydrogen, which is so liable to change, is still good or has become decomposed; or whether his solution of bichloride of mercury has become inert by the reducing action of organic matter in the water under the influence of sunlight. And so of many other chemicals used in the dental office which are apt to change in strength.

Prof. Chas. Mayr, of Springfield, Mass., has prepared a series of test-papers, which will enable the dentist to learn quickly and accurately whether his preparations are good or worthless, and without the use of cumbersome methods. They are put up in neat little books, each containing eight different papers (of some, like litmus, several papers are provided), affording sixty-four different reactions. The papers are as follows:

Phenyl-Carbinol, for strong acids and alkalies.

Turmeric, for alkalies.

Sulphite, for solution of metals.

Potassium Iodide, for H_2O_2, bichloride 1/500.

Iodide Starch, for hydrogen peroxide.

Litmus, for weak acids and alkalies.

Erythorine, for salts and alkalies.

Lacmoid, substitute for litmus, not affected by carbonic acid.

Each paper has printed upon it the reactions it gives, so that even the inexperienced have a safe guide as to its uses.

CATAPHORESIS.

Cataphoresis, Electrical Diffusion, and Electrical Osmosis are terms which designate a method of treatment for hypersensitive

dentine, for the devitalization of pulps of teeth, for opening abscesses, for aborting abscesses, for sterilizing medications in roots of teeth, for acute periodontitis, for bleaching discolored teeth, for sensitiveness in the preparation of teeth and roots, for crown and band adjustment, etc., etc. The definition of the term cataphoresis as given by Prof. William J. Morton, M. D., is, "The movements of fluids, together with the substances they hold in solution, from the positive pole of electrodes conveying a continuous current in tissue toward the negative pole." These fluids contain elements in solution which make them medicines and these medicines must flow from the positive to the negative pole conveyed by the current; hence if application is made to one tissue by the positive pole, and to any remote part by the negative pole, the solution has a tendency to flow with the current, and these medicines will travel in that direction.

Although any form of battery which is constant when the ampèrage of the individual cell is from one-fourth to five-eighths of an ampère, will answer, yet the dry chloride of silver cell is probably the best for treatment by this method, on account of its constancy and durability.

The voltage which concisely represents the pressure of the current, is indicated by the numbered attachments, and the pressure may be increased at pleasure. The milliampère dial records the flow of the current through the tissues, and a current controller furnishes in the smallest quantities further pressure upon the tissue, as may be suggested by the case in hand. Clinical experience suggests that as regards the current strength, a large voltage is not necessary in securing the desired results. Generally from one-half to one and a half milliampère registrations will be sufficient to anæsthetize perfectly. A low voltage also insures comfort to the patient. Another important element is uniform and continuous constancy of current application. If the current is spasmodic or unreliable in any degree, the result sought for will be impaired and the comfort of the patient be seriously disturbed. The continuous application of the current should be maintained to the end of the operation, and when a renewed application of the anæsthetic solution is desired, no disconnection should take place, but the solution should be added with the appliance in place.

The electrode should not be removed from the point where it is first applied until after the current is shut off. The voltage required to produce the necessary electro-motor force to produce anæsthesia of the dentine of a tooth varies from five to thirty cells. For children's teeth ten cells may answer, although from fifteen to twenty are generally required. The dry Seclauche battery is also a good form of an open cell appliance, for as long as the circuit is open there is no loss. The dry chloride of silver battery will usually give seven hundred hours of work under a high resistance of tissue.

Cocaine, in from twelve to twenty-four per cent. solutions of the hydrochlorate, is generally employed in the cataphoric method, although as high as a forty per cent. solution has been used. One and one-fifth grains of hydrochlorate of cocaine to ten minims of distilled water, will give a twelve per cent. solution; the same quantity of the cocaine to seven and a half minims of water will gave an eighteen per cent. solution, and a similar quantity of salt to five minims of the water will give a twenty-four per cent. solution.

The citrate of cocaine, eucaine, tropacocaine, quiacolcocaine oil of cassia incorporated with a trace of pulverized soda sulphate, chloride of sodium, and cocaine and boric acid have also been used with good results in the cataphoric treatment; and in fact any local anæsthetic which is a conductor of electricity can be so employed. The instrument or rheostat, however, should be so constructed as to give the operator at all times perfect control of the current, and he must be able to raise this element from a weak to a strong current, by such minute gradations that it will be almost imperceptible to the patient.

The application of the rubber dam is necessary, so adjusted that no leakage of the current at the neck of the tooth can occur. The exposed surface of any gold or other metallic filling in the tooth should be coated with sandarac varnish, and the cavity, from which the carious matter need not be removed, is carefully dried and loosely filled with cotton saturated with the obtunding solution.

The platinum point of the anode is covered with a light layer of cotton or lint which is dipped into the obtunding mixture.

The cathode is attached to the left wrist of the patient, and its metallic surface prevented from coming in contact with the skin by means of lint or cotton saturated with a solution of chloride of sodium. All being ready, the point of the anode is inserted in the cavity in contact with the cotton loosely filling it, and the switch is placed on the first contact point of the instrument, and then slowly over the contacts until the patient exhibits some indication that the current is felt. The switch should be retained at such a contact until the sensation subsides, when the resistance of the controller should be gradually lessened. This procedure is continued as long as no pain is felt, when the switch may be more rapidly moved, and if no sensation is experienced, it may then be concluded that the anæsthesia is complete. The switch is then moved back to the zero point, and the operation on the tooth commenced.

The time required to produce anæsthesia varies from eight to fifteen minutes, although a longer time may be necessary when the dentine is very dense.

The effect is better when the application is made directly to the carious matter in the cavity; and the deeper the cavity and the nearer approach to the pulp indicates a less degree of voltage. The removal of the anode while the current is on and before the anæsthesia is complete, causes great discomfort to the patient, and, hence, should be avoided.

The appliances for bleaching discolored teeth by cataphoresis are the same as those required for obtunding the hypersensitiveness of dentine. The agents employed are a 25 per cent. aqueous solution of peroxide of hydrogen, the ethereal solution opposing too great resistance to the current.

The 25 per cent. aqueous solution of peroxide of hydrogen is readily made by shaking together in a test tube one volume of water and two volumes of 25 per cent. pyrozone. The peroxide dissolves in the water, and the ether of the pyrozone is evaporated by heat. The ethereal solution of peroxide of hydrogen opposes too much resistance to the current. Adding a small quantity of acetate of sodium or sulphate of sodium will facilitate the passage of the current through the aqueous solution of the peroxide of hydrogen.

The application of the current is the same as in the treatment

of hypersensitive dentine, the tooth cavity being filled with cotton saturated with the bleaching solution.

A. I. F. Buxbaum, M. D., D. D. S., gives the following as his experience in the use of cataphoresis: "Cocaine applied cataphorically has been proven to have no systemic effects, but is entirely local in its action. Apply cocaine by cataphoresis to a central incisor, and the adjoining central or lateral will be as sensitive as if no application had been made. I can say, however, from my practical experience, that the gum immediately surrounding the anæsthetized tooth is less sensitive than normal. It has also been my observation that when a pulp is completely anæsthetized, that tooth takes on the appearance of a devitalized tooth,—namely, the tooth becomes darker, and when drilled, seems dry (pulverizing, so to speak), the dentine giving off the odor of dead bone when cut or filed. I have also observed that any slight oozing of blood from the gum immediately surrounding the tooth to be anæsthetized stops upon using cataphoresis. To test the power of cataphoresis I have used a red-hot instrument over a pulp scarcely covered with a thin layer of dentine, and no response was given; I have gone further and drilled into pulps which I wished to devitalize, and in some cases no response was made, in others only a trifle. Where I wish to devitalize a pulp by means of an arsenical application, and do it painlessly, I first use cataphoresis, then drill into the pulp and apply arsenic. The greatest objection to cataphoresis has been the time consumed in its application, which at first occupied anywhere from 30 to 40 minutes. After becoming more familiar with this method I was able to cut down the time to thirty, twenty, fifteen and twelve minutes, according to the patient and tooth. I am now able to anæsthetize in fifteen, twelve, ten, seven and five minutes. The duration of the anæsthesia varies in different cases, lasting from one-half to six and eight hours. I have yet to find a case where the result has not been favorable. The danger of cataphoresis lies not in its application to the patient, but in the care and boldness with which a dentist can operate. If a dentist be careless be could easily penetrate or expose the pulp. Not eliciting any pain, he might be careless and not protect the pulp. Another great advantage found in cataphoresis is all freedom from pain when finishing off a filling with disks,

strips,' stones, etc. I have found, the larger the cavity and the softer the dentine, the more readily will cocaine be transmitted."

Electric Units: Ampère—the unit of measurement of an electric current; the unit of strength. Ampère-hour—a unit of electric quantity equal to one ampère flowing for one hour; it is the equivalent of 3600 coulombs. Coulomb—the unit of measurement of electric quantity; the quantity of electricity that passes during one second through a conductor having a resistance of one ohm, with one volt of electro-motive force. Ohm—the unit of resistance. Volt—the unit of electro-motive force, or the force sufficient to cause a current of one ampère to flow against a resistance of one ohm. Watt—the unit of power. Unit of current—a conductor one cm. long which, if bent into an arc of one cm. radius, will act with the force of one degree on a unit magnet pole at the centre. Dyne—the unit of force. Farad—the unit of electric capacity. Erg—the unit of electric work. Volt-ampère—the unit of electric work; the amount of pressure developed by a current of one ampère having an electro-motive force of one volt. Volt coulomb—the unit of electric work. Weber—an ampère. Unit of work—the erg. Joule—the unit of electric energy. Milliampère—one-thousandth of an ampère.

ERUPTION OF THE TEETH.

TEMPORARY TEETH.

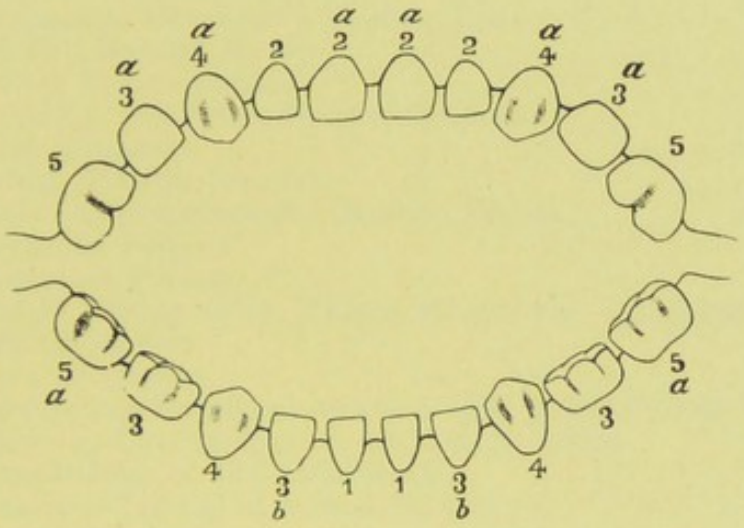
(The inferior generally precede the superior by two or three months.)

Central incisors	5 to 8 months.
Lateral incisors	7 to 10 months.
First molars	12 to 16 months.
Canines	14 to 20 months.
Second molars	20 to 36 months.

The following diagram, by Dr. Louis Starr[1], shows the grouping, the date of eruption and the duration of the pauses between the appearance of each group of temporary teeth.

[1] Diseases of the Digestive Organs in Children, Philadelphia, 1891.

The numbers 1 to 5 indicate the groups to which the individual teeth belong and their order of appearance, and the letters *a* and *b* the precedence of eruption in the different groups



EXPLANATION OF DIAGRAM.

1. 1. Between the fourth and seventh months. Pause of 3 to 9 weeks.

2. 2. 2. 2. Between the eighth and tenth months. Pause of 6 to 12 weeks.

3. 3. 3. 3. 3. 3. Between the twelfth and fifteenth months. Pause until the eighteenth month.

4. 4. 4. 4. Between the eighteenth and twenty-fourth months. Pause of 2 to 3 months.

5. 5. 5. 5. Between the twentieth and thirtieth months.

PERMANENT TEETH.

First molars . .	5 to 6 years.	Second bicuspids	10 to 12 years
Central incisors .	6 to 8 "	Canines	12 to 13 "
Lateral incisors .	7 to 9 "	Second molars .	12 to 14 "
First bicuspids .	9 to 10 "	Third molars . .	17 to 21 "

The Formula for the Permanent Teeth.

$$I\frac{2-2}{2-2},\ C\frac{1-1}{1-1},\ B\frac{2-2}{2-2},\ M\frac{3-3}{3-3}=32.$$

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